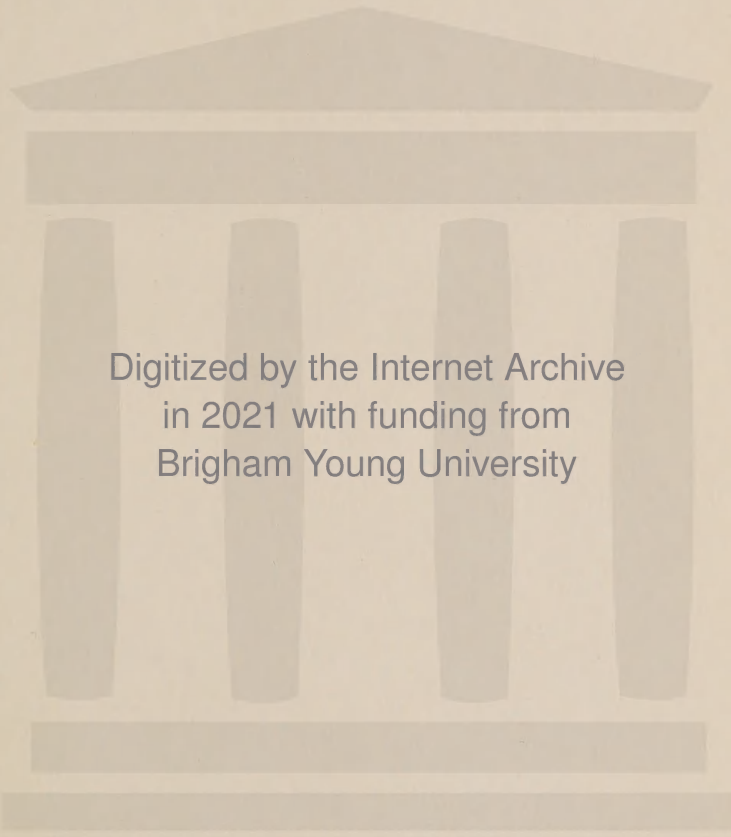


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CERAMIC ABSTRACTS

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Abrasives

PATENTS

Process of producing carbides of sodium and boron. CHARLES E. PARSONS. U. S. 1,473,510, Nov. 6. The process of simultaneously producing sodium carbide and boron carbide from sodium tetraborate, which consists in melting said borate out of contact with the air; raising the temp. to a point between 1000°C and the point of dissoen. of said borate; adding sufficient carbon to produce the desired sodium and boron carbides; and recovering said carbides.

Alumina. A. L. PEDEMONTE. Brit. 195,295, May 5, 1922. Pure Al_2O_3 is obtained from ferruginous bauxite by heating in a reducing atm. to render the Fe and Ti magnetic, sepg. these impurities by magnetic action, dissolving the purified bauxite in HCl or H_2SO_4 , digesting to render SiO_2 and any remaining Ti insol., filtering, and evapg. the filtrate to dryness and calcining the Al salt to obtain Al_2O_3 and recover the acid. (C. A.)

Art

Intimate discussion of American china ware. ANON. *Ceramist*, 3, 38-47(1923).—Foreign porcelain wares are considered as belonging to 2 groups: the porcelain of Limoges (French china) which has a hard feldspar glaze, and English bone china, having a softer glaze. French ware lends itself best to delicate underglaze treatment. Brilliant colors are not often seen and overglaze decorations do not fuse well into the hard glaze. The English china is the supreme ware for rich coloring. Broad bands ground-laid over the glaze and fired hard form a distinctive treatment that is exclusive. All the English overglaze colors are brilliant because the soft glaze assimilates them well. The use of rich gilding is not defended. This method of decoration belongs to the 18th century. It was brought to perfection under the kings of France in probably the most debased period of art in history. The following are cited as examples of epoch making departures in the artistic treatment of ceramic wares: the ivory finish of Royal Worcester wares, 1880-95; Rookwood matt glaze in 1890; Copenhagen overglaze painting, 1893 and Rookwood vellum, 1903. American potters will not undertake the manuf. of hard porcelain, because it will require the adoption of methods radically different from those in present use. The manuf. of English or bone china is the alternative. The following suggestions are made relative to the manuf. of this ware. Cone 10 is better than cone 9 for the biscuit fire. The glaze should not be fired above cone 4; the body will have to be adjusted to the use of feldspar instead of Cornwall stone; the Dillsboro North Carolina kaolin can be used if available of uniform quality. Close attention to the grinding of a body is imperative. The best ware cannot be made on high speed plan. Placing of the bisque and the ware is a special problem which will require careful attention. Decoration of ware should be in charge of a skilful designer who is not bound down by traditions of the past. Seconds ware should not be sold in competition

with the best. Attention is called to the keen interest which is being displayed in the study of pottery and porcelain by women's clubs. C. W. P.

Casein colors and paints. MAURICE DE KEGHEL. *Rev. prod. chim.*, **26**, 469-72, 501-6(1923).—A description of the prepn., properties and uses of water colors having a casein binder, casein paints (for art work), and casein varnishes. A. P.-C. (C. A.)

Cement, Lime and Plaster

Artificial cement plants at Marcoing (France). AVRAM J. LUSTMAN. *Rev. Mat. Constr. Trav. Pub.*, **166**, 157-9(1923).—Description with 10 figures of plants of "Société Anonyme des Ciments Artificiels de Cambrésis" started in 1921, with a capacity of 400 tons of artificial cement in 24 hours. L. N.

Slag brick manufacture. ANON. *Rev. Mat. Constr. Trav. Pub.*, **168**, 206-9 (1923). L. N.

Carbonating lime at dull red heat. GERMAIN MOUSTIER. *Rev. Mat. Constr. Trav. Pub.*, **168**, 198-9(1923).—*Hydrated Lime* having the following per cent chem. compn., $\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ 1.5, CO_2 0.8, combined H_2O 20.7, total CaO 74.3, MgO 0.6, unanalyzed 2.1, was heated at a dull red heat in a small muffle fur. with a kerosene lamp. After $1\frac{1}{4}$ hr. of heating, 150 gm. of lime were found to have been carbonated to the extent of 9.4% of the total CaO . In a series of expts. 0.703 gms. of *quicklime* were heated in a covered platinum crucible to a dull red ht. with an alcohol vapor burner, carbonating of the lime being after 2.3 hrs. of htg. 19.2%, 6.3 hrs. 80.0%, 8.3 hrs. 84%, 10.3 hrs. 85%. The importance of the presence of gases of combustion in the cooling region of kilns is emphasized. L. N.

Resistance of "Vassy" cement mortars to the action of selenitic waters. R. M. *Rev. Mat. Constr. Trav. Pub.*, **168**, 199-202(1923).—A general historic review of French literature relating to the experiments on the natural cement of Vassy, which withstands the destructive action of sea water, and water charged with alk. earth sulphates. (With photographs of testpieces after long exposures.) L. N.

The gypsum industry. A. BRITTAIN AND C. ELLIOTT. *Trans. Ceram. Soc. (Eng.)*, **22** [1], 44 (1922-23).—A paper on the consideration of the general methods employed for the conversion of the mineral into its manufd. products and testing of these products. H. F. S.

Fused cement. ANON. *Quarry & Surveyor & Contractors' Jour.*, **28**, 293(1923).—Fused cement tests have revealed that in the Hennibique system a higher coeff. of safety for concrete under the usual stresses is procurable than can be obtained with Port. cement. For concrete beams, the deflections before rupture with fused cement in the mix were always stronger than with Port. cement. Fused cement, however, is not very binding, consequently great care must be observed in pounding, releasing the molds, etc. In the mix, too much sand is better than not enough, and the best prepn. of water is 150 l. per 800 l. of gravel and 400 l. of sand; the materials should be mixed till of a plastic consistency. All surplus water should be thoroughly drained off in every opern. O. P. R. O.

Proper handling of lump lime. ANON. *Contract Rec. and Eng. Rev.*, **37**, 1071 (1923).—When using a quick-slaking lime, if insufficient water is added, the paste is not as plastic and works short. It feels slightly gritty, and has a yellowish tinge. The temp. of the mass is raised considerably above b. p., and a new chem. reaction takes place. This results in a formation of a subs. which absorbs carbon dioxide at a rapid rate, and thus hardens before it may be used. Exactly what this new compd. is, has not been definitely detd., but the result is well known by those who use lime. In the case of "drowned" lime, the excess of water has absorbed too rapidly the ht. for slaking, and the change from quicklime to paste is retarded. When the paste is formed it is thin

and watery and unsatisfactory. A good lime putty, properly prepd. and allowed to age or soak for some time previous to its use, makes a mortar or plaster that is easily applied; aging the paste imparts to it a degree of smoothness not otherwise obtained.

O. P. R. O.

Adhesive for mother-of-pearl, horn and wood. ANON. *Oil & Color Trade Jour.*, 64, 1444(1923).—An excellent cement can be prepd. by mixing glue, suitably diluted, with a corresponding quantity of strong warm vinegar, adding a certain amt. of ordinary alcohol with a little alum. The cement thus obtained possesses a very great cohesive power, and will keep perfectly fresh in well stoppered bottles. The following process may also be observed: For natural woods, make a cement with a basis of sawdust and glue. For mother-of-pearl and horn, use a cement based on powdered zinc white and floor varnish.

O. P. R. O.

Potash and waste heat recovery from cement kilns. ANON. *Chem. Age*, 9, 442(1923).—A new method of effecting recovery of potash from dust of cement kilns (an English invention) is described. This process presents possibilities in the way of utilizing waste ht. for steam-raising purposes. Expts. have shown that with certain grades of raw mat. some of the dust from the kilns will collect in caked form on hot surfaces. This mat. contains potash salts and other ingredients which make it valuable and may be sold at a higher price than the finished cement. The part of the dust adhering or caking to the hot surfaces has a different chem. compn. from the rest of the dust which will not so adhere, making possible the recovery of the valuable by-product. The mat. is removed from the walls by means of scrapers; from the primary collecting flue hot gases are led through a ht.-absorbing device in the shape of a waste-ht. boiler. Here a considerable reduction in temp. of the gases is effected; their vol. and velocity are likewise reduced and sepn. of the remainder of the dust is facilitated. Because of the cooling of the gases in this way the dry dust separators beyond the boiler have gases of less velocity to handle; the washers through which the gases subsequently pass, operate much more satisfactorily on the cooled gases, as very hot gases tend to evap. and carry away the spray water in the form of steam, and interfere with the satisfactory opern. of the washer generally. The cooled gases are also more readily handled by the fan. In cases where the final removal of the dust is effected by elec. means, the reduction in temp. of the gases is of advantage.

O. P. R. O.

Cement from blast furnace slags. ANON. *Quarry & Surveyor & Contractors' Jour.*, 28, 294(1923).—Recent expts. show that Port. cement may be manufd. from acid blast fur. slags by the addition of certain missing oxides (lime and alumina) to the liquid slag. The best practice is first to add the alumina, then the lime, and thus obtain a very fluid melt, which easily takes up lime. The m. p. remains low for a long time, but the process appears difficult to carry out on account of the high temp. necessary.

O. P. R. O.

The French "fused cement (electric)." NITZSCHE. *Zement*, 12, 142-3(1923).—A tabulation and comparison of the analytical results and phys. properties of "fused cement" obtained by different investigators.

R. F. S. (C. A.)

Simple cement tests. A. T. FRY. *Commonwealth Eng.*, 10, 442-5(1923).—In the absence of a testing machine, make test bars 1 x 1 x 10 in. Support them at the ends and apply the load by means of a special hook at the center of the bar. A bucket is suspended from the hook and lead or shot used for loading the bucket. The corresponding tensile strength may then be calcd. from the load and span of the bar.

R. F. S. (C. A.)

Relations between volume and strength. H. KÜHL. *Zement*, 12, 236-7(1923).—The present available data on Portland cement do not permit any relationships to be drawn between the vol. and strength of the cement.

R. F. S. (C. A.)

Do slags rich in lime give fused cements? C. PRUSSING. *Zement*, 12, 255-9

(1923).—Mixt. of the ternary system SiO_2 - CaO - Al_2O_3 , which were all rich in CaO , were studied. The CaO content of slags cannot be increased above 51% without decreasing the hydraulic properties. Cryst. systems below 60% CaO show weak hydraulic properties. R. F. S. (C. A.)

PATENTS

Waterproof concrete. A. G. LINDÉN. Swed. 52,563, Aug. 23, 1922. A mixt. of 70–30 parts of cement and 30–70 parts of pulverized brick or talc. (C. A.)

Acid-proof mortar. E. S. QVIDINGER. Swed. 52,765, Sept. 20, 1922. An intimate mixt. of cement with finely pulverized chamotte and alum-slate is stirred with a suitable quantity of a soln. of alkali silicate of convenient concn. (C. A.)

Treating slag bricks. AKTIEBOLAGET ARCUS BETONGINDUSTRIE. Swed. 53,126, Nov. 29, 1922. The freshly formed bricks are subjected to steam or steam jets to bring about a preliminary binding before the hardening in the air. (C. A.)

Cements. H. KONTZLER. Brit. 193,372, Aug. 1, 1922. Slow-setting cements are produced by the fine pulverization of an intimate mixt. of gypsum with aluminates, hydroxides of Al_2O_3 such as bauxite, or natural or artificial pozzuolanas, *e. g.*, blast furnace slag. In the case of a slag contg. less than 30% of SiO_2 and more than 10% of Al_2O_3 , 16–20% of gypsum, previously dried at 80°, is used. (C. A.)

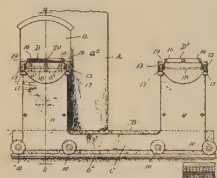
Cements. A. F. MUELLER. Brit. 197,702, May 15, 1923. A hydraulic cement consists of a finely divided mixt. of foundry slag with ferruginous, siliceous, and alumina-, lime-, and magnesia-contg. ingredients in proportions depending upon the compn. of the slag, and with or without clinkers from furnace residues. Clinkers are preferably used which have been freed from coke, etc., by the process described in 146,238, and have thereby become coated with clay, chalk, gypsum, or carbide sludge. Suitable ferruginous addns. are bog ore, Permian limestone, brown ore, Porta stone, ferruginous sandstones, aluminous siderite, slate, ferruginous earths from Paleozoic and Permian formations, finely divided Fe, waste sand dust and sludge from the grinding and polishing of Fe castings, and waste molding sand. Al_2O_3 is furnished by ferruginous clay. MgO is preferably added in the form of mica sand. Suitable calcareous subs. are slaked lime, lime-kiln waste, gypsum dust, and carbide sludge. Artificial stones are obtained by mixing 15 to 25 pts. of the cement with 100 pts. of granulated clinker, breeze, or slag, with or without other filling materials such as sand, pebbles, ground wood, etc. A small amt. of an alkali salt, such as Na_2CO_3 , may be added to accelerate setting and increase strength. (C. A.)

Enamels

Types of iron and steel which do not rust or ignite. K. DAEVES. *Prazision*, 1, 270–1; *Physik. Ber.*, 3, 667–8.—The difficulties encountered in working non-corrodible, high-Cr steels are lessened by reducing the C content and by corresponding heat treatment. Ordinary rust-proof steel consists of about 13% Cr, 0.5% Ni, and 0.7 to 1.0% C. After hardening it has a rigidity of 110 to 170 kg./mm.², which is not affected by heating to 500°. The coeff. of expansion is 11×10^{-6} . Both heat and elec. condy. are less than that for C steel. Cold work decreases resistance to rusting. Resist. to HCl and H_2SO_4 is not perfect but atm. oxidation does not take place even at 900°. Where special hardness is not required a steel of 13% Cr and 0.1% C is recommended. These steels may be cast, forged, stamped, machined, etc. For surgical or dental instruments a higher Ni content is recommended. All these steels are useful for phys. or chem. app. used at high temps. Their cost is about 10–12 times that of ordinary steel. A. E. S. (C. A.)

PATENTS

Charging fork for enameling furnaces. WILLIAM HOGENSON. U. S. 1,471,028, Oct. 16. Charging means for enameling fur. comprising a traveling, wheeled carriage,



two widely spaced sets of track bars secured on said carriage, and two fork frames mounted on rollers that travel on said track bars, each fork being movable independent of the other, and there being free and unobstructed loading and unloading passages between said sets of track bars, and between said fork frames, whereby either fork frame may be loaded and unloaded from either side.

Method of cementation of boron into the surface of iron or steel. TAKEO MIYAGUCHI. U. S. 1,472,850, Nov. 6. A method of cementation of boron into the surface of iron or steel comprising covering the desired surface of the iron or steel with a mixt. of carbon powder and boron oxide or compd., and heating it at from 800°C to 900°C in a reducing atm. Brit. Pat. 193,917, Nov. 3, 1921.

Method of cementation of boron into the surface of iron or steel. TAKEO MIYAGUCHI. U. S. 1,472,851, Nov. 6. A method for the cementation of boron into the surface of iron or steel, comprising placing the iron or steel within a closed fur., covering the portion desired to be cemented with a finely powdered boron contg. mat., shielding the remaining portion with iron plate, iron powder, clay or the like to prevent cementation action of boron, and heating the iron or steel for a considerable period, at from 800–900°C in the presence of chlorine gas. Brit. Patent 193,918, Nov. 3, 1921.

Enamels. CHEMISCHE WERKE VORM. AUERGES. Brit. 197,933, May 10, 1923. To prevent opaque enamel from bubbling during firing, a portion of the clay which is usually added to the mill is first made incandescent and then added to the other ingredients. One-half of the clay may be so treated, and the process is stated to be particularly applicable when Zr or Ce oxide is present. (C. A.)

Glass

Table of Belgian patents in the glass industry. J. GEVERS AND CO. (Antwerp). *Le Verre*, 3, 200–1(1923).—The "Dictionary of Patents" listing the number of patents granted in Belgium from 1830 to the end of 1922 contains a list of patents relating to the glass indus. The table contains 2847 patents subdivided according to 62 classifications: as "fusion of glass" 182 patents, "reinforced glass" 19, "optical glass" 1, etc. About $\frac{1}{3}$ of these patents are of Belgian origin, the remainder of foreign origin, especially Amer., Eng., French and Ger. L. N.

Furnaces for melting glass. H. MAURACH. *Glass Worker*, 43 [1], 11(1923); (from *Fuels and Fur.*, Aug., 1923).—The Ger. Advisory bureau report of 1921–1922 on tanks and pot fur. In older fur. the depth of the bath is 27.6 in. Newer practice is 43.3 to 47.2 in. deep. 59.4 in. is the max. Low flat roofs are now used. For a span of 21.3 ft. the rise of the arch is 29.5 in. The distance from the crown to the bath is 5.2 ft. The arch is 10 to 14 in. thick. 4 to 6 inches of glass can be melted and taken out every 24 hrs. Gas ports are discussed and a table of dimensions given for the size of ports for various sizes of pot and tank fur. Sketches of fur. design are given. There should be 2.6 to 4 cu. ft. of checker work per cu. ft. of fur. vol. for tanks. Pot furnaces require two times these values. R. J. M.

Gas producer practice. W. B. CHAPMAN. *Glass Worker*, 42, 39, 11(1923).—The ht. balance on a gas producer, with the method of calcn., is given in detail. R. J. M.

The manufacture of optical glass. C. J. PEDDLE. *Trans. Opt. Soc. (London)*, 23, 103(1922).—This paper describes briefly the history of optical glass manuf. from the

earliest attempts to date. The present methods of manuf. in Great Britain are then described in more detail. Only 50% of the glass usually passes the preliminary inspection and if 20% of the total is usable after finishing, the melt is considered satisfactory. The yield is often under 10%. "The only sure method of testing for fine striae in glass

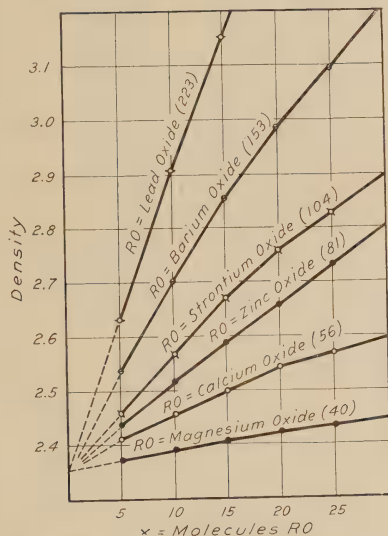


FIG. 1.—Molecular composition and density in the series 100 mols. $\text{SiO}_2 \cdot 20 \text{Na}_2\text{O} \cdot x\text{RO}$.

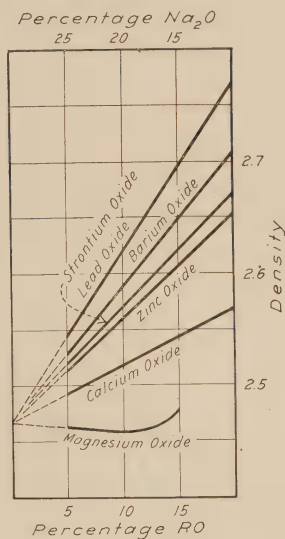


FIG. 2.—Percentage composition and density. (Silica constant = 70%.)

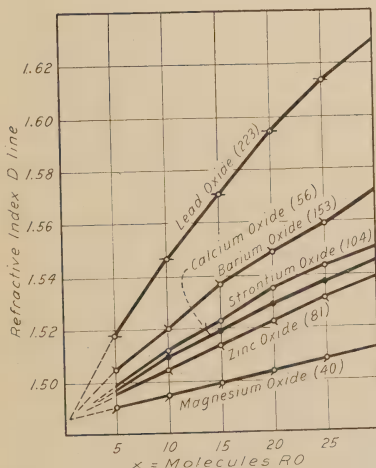


FIG. 3.—Molecular composition and refractive index (μ_D) in the series 100 mols. $\text{SiO}_2 \cdot 20\text{Na}_2\text{O} \cdot x\text{RO}$.

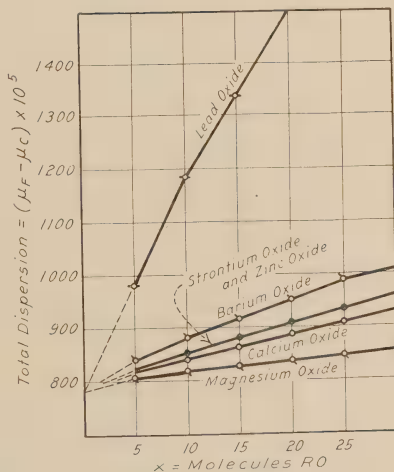


FIG. 4.—Molecular composition and total dispersion in the series 100 mols. $\text{SiO}_2 \cdot 20 \text{Na}_2\text{O} \cdot x\text{RO}$.

is the examn. of pieces of glass, polished on opposite faces, by means of a polariscope." The author has studied the influence of compn. upon density, refractive index, durability and tendency to devitrification (cf. *C. A.*, 14, 2536; 14, 2509; 15, 2966; 16, 620; 16, 3180), and these are discussed. The effect of diff. oxides on the d. of glass depends on the mol. wt. of the oxides. In glasses of compn. 100 SiO_2 .20 Na_2O .10 RO the densities and mol.

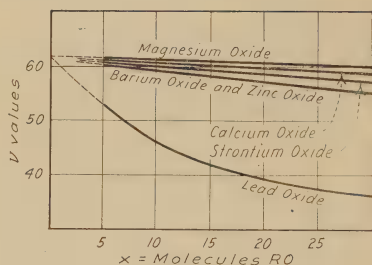


FIG. 5.—Molecular composition and ν value in the series 100 mols. SiO_2 . 20 Na_2O . $x\text{RO}$.

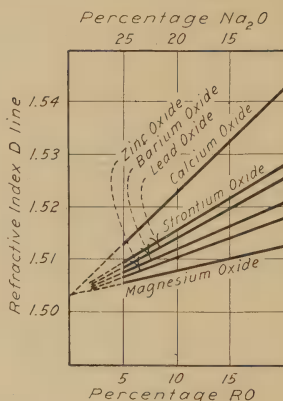


FIG. 6.—Percentage composition and refractive index. (Silica constant = 70%.)

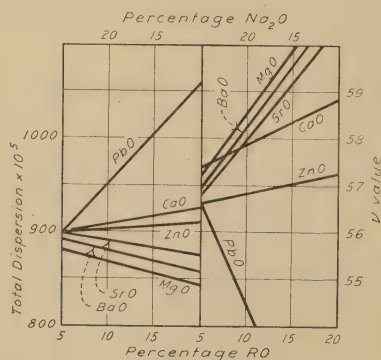


FIG. 7.—Percentage composition and total dispersion. (Silica constant = 70%).

FIG. 8.—Percentage composition and ν value. (Silica constant = 70%.)

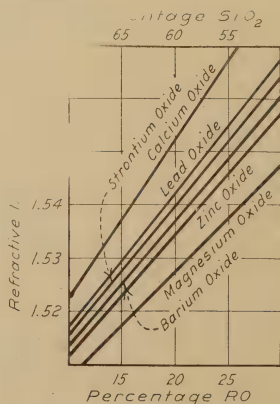


FIG. 9.—Percentage composition and refractive index. (Sodium oxide constant = 20%.)

wts. are in the following order: RO = PbO (223), BaO (153), SrO (104), ZnO (81), CaO (56), MgO (40), densities of glasses are 2.91, 2.71, 2.57, 2.52, 2.46, and 2.39, respectively. The curves illus. the connection between the phys. properties and chem. compn. of glasses. Durability of the glasses was tested by the action of water at 80°C on the

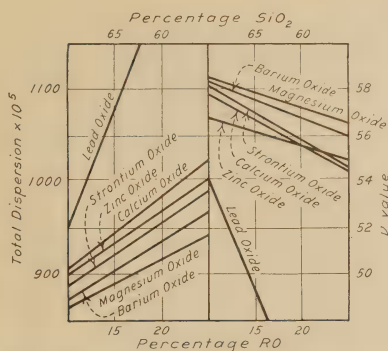


FIG. 10.—Percentage composition and total dispersion. (Sodium oxide constant = 20%.)

FIG. 11.—Percentage composition and ν value. (Sodium oxide constant = 20%.)

powdered glass. ZnO has the greatest effect on improvement of durability when replacing SiO_2 or R_2O wt. for wt. The RO oxides improve durability in order of their mol. wt., MgO being best and PbO worst. Photographs are given of crystals formed in the devitrification of glasses. The paper includes a short bibliography of modern papers on optical glass. *Ceram. Abs.*, 1 [4], 111 (1922); 1 [6], 165-6 (1922). D. E. S.

Preheating glass batch. A. FERGUSON. *Glass Worker*, 42, 39, 15 (1923); (from *Pottery Gaz. and Glass Trade Rev.*).—The batch, ground to 60 mesh and preheated to 850°C to free it from CO_2 , is introduced into the tank at the rate of 2 lbs. per sec. Waste ht. is used for prehtg. R. J. M.

Specifications for glazing glass. ANON. *Glass Worker*, 43 [4], 9 (1923).—Specif. are published by the Bureau of Standards, assisted by the manufacturers, covering plate, window, processed, rolled figured, wire, ornamental and prism glass. Nomenclature and definitions are also given. R. J. M.

Continuous sheet glass machine. ANON. *Glass Worker*, 43 [5], 9 (1923).—A new flow device produces flat sheet glass of any thickness. A continuous sheet 365 ft. long and 40 in. wide goes through the leer. Installation at the plant of the Licking Window Glass Co. is described. R. J. M.

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Method and apparatus for forming sheet glass. HUBERT A. MYERS. U. S. 1,471,189, Oct. 16. In an app. for forming sheet glass, a tank for containing molten glass from which glass may flow continuously in sheet form, means for successively feeding end strips in pairs to the opposite edges of the sheet being formed lengthwise of the movement thereof in adherence therewith, means for successively applying upper and lower sets of cross bars to the upper and lower ends of each pair of edge strips and

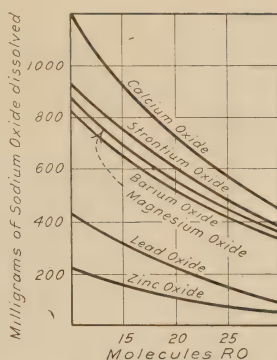
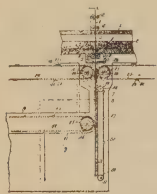


FIG. 12.—Molecular composition and solubility of glasses. $100 \text{ SiO}_2 \cdot 20 \text{ Na}_2\text{O} \cdot x\text{RO}$.



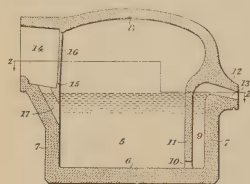
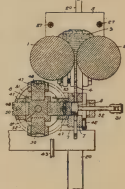
FIG. 13.—Percentage composition and solubility. Sodium oxide constant = 20%.

to the sheet to cooperate with the edge strips to embrace a predetd. sheet area, means for guiding the vertical movements of the frame sheet section and adapted to release the upper and lower ends of each frame for horizontal movement when it has reached a predetd. point in its vertical movement, and means for engaging and moving each frame section laterally from the guide means when in side delivery position and to effect a severing of the sheet between the upper end of the laterally moving section and the lower end of a succeeding section.



Paste for etching glass. LEO SIMON. U. S. 1,470,772, Oct. 16. A paste for etching glass, containing ammonium sulphate, hydrofluoric acid and a liquid mucilage.

Process and apparatus for producing spectacle blanks. FREDERICK GELSTHARP. U. S. 1,471,725, Oct. 23. Apparatus for producing glass articles, means for generating a sheet of glass continuously in a downward direction, a plunger mounted beneath said means for movement transversely through the sheet, and a drum mounted for rotation in opposition to the plunger and provided in its periphery with a series of mold recesses adapted to be brought successively into alignment with said plunger to receive the articles, means for continuously operg. the rolls and means for intermittently operg. the plunger and drum.



Glass-melting pot. CLINTON A. BOWEN. U. S. 1,471,824, Oct. 23. A glass-melting pot composed of a body closed at the top and having a mouth near the top thereof and projecting therefrom, said mouth being provided with a door, and an opening formed in the bottom of said mouth and communicating with said body below said door, said opening being so positioned that molten

glass can be fed into the body below the normal working level of the glass therein.

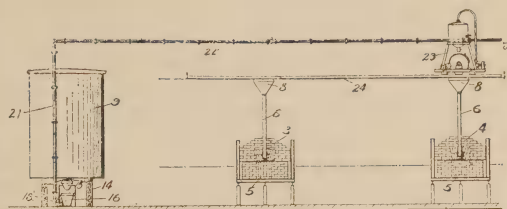
Blowpipe for glass-making apparatus. JOHN CARMANY CAMPBELL. U. S. 1,472,291, Oct. 30. A device of the character described comprising a hollow body open at its lower end, said body having oppositely disposed flat walls positioned close together and connected at their ends, an inwardly extending horizontally disposed flange at the lower end of the walls of said body terminating in an inwardly and upwardly extending lip, and an air pipe extending from the top portion of said body.



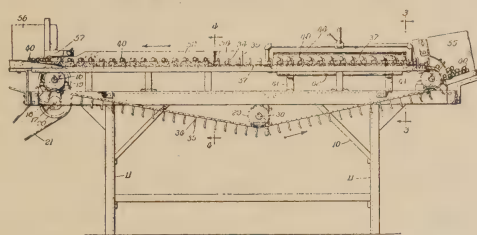
Glass. CHANCE BROS. & CO., LTD. and A. L. FORSTER. Brit. 197,590, April 11, 1922. Relates to glass of the kind in which Fe_2O_3 is combined in the ferrous state to enable the glass to act as a good absorber of thermal radiation. According to the invention, the propn. of Fe_2O_3 is such that the amt. of FeO per unit area of the glass will give the desired absorption and transmission of thermal and luminous radiations. *E. g.*, hammer scale or Fe oxalate is added in such quantity that the finished glass sheet contains about 0.01 g. of FeO per sq. cc. of surface. It is found that with such a glass, the ratio of luminous radiation transmitted to thermal radiation absorbed is a max. and the glass is suitable for window and roofing purposes in hot countries. (C. A.)

Raw-material conveyer for feeding glass furnaces. WILBUR F. BROWN. U. S. 1,473,008, Nov. 6. The method of feeding raw mat. from a common source of supply to a plurality of glass melting furnaces, consisting in drawing the several materials by suction through a conduit to the vicinity of any selected furnace, there mixing the materials together, and then delivering the mixed batch directly to the fur. An app. for conveying raw mats. from the storage tanks to a plurality of glass melting fur.,

comprising a conduit extending from the storage tanks to the fur., means for feeding the mats. from the tanks to the conduit, means for drawing the mats. through the conduit by suction to any selected fur., and means for there delivering the mats. from the conduit to the fur.



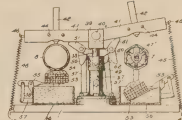
Glazing machine. HANS N. HALVERSEN. U. S. 1,473,675, Nov. 13. In a glazing appliance of the character described, the combination of two htg. means positioned to successively heat the opposite ends of the bodies treated, a guide-plate for each of said heating means, a support having portions sloping in opposite directions toward said



guide-plates, and a pair of parallel endless conveyor chains equipped with forwardly bent fingers to engage and roll the inclined bodies to be glazed along said support first with one end against one guide-plate and the opposite end subject to the action of the corresponding heating means, and subsequently with the glazed end against the second guide-plate and

the other end in a position to subject it to the action of the second heating means, said support and bent fingers maintaining in each instance the end being glazed in advance of the end bearing against the guide plate substantially as described.

Glass-banding machine. JAMES BOYD GREER. U. S. 1,473,762, Nov. 13. A cutting machine comprising an intermittently rotating chuck adapted to receive the article to be cut, means for actuating the same, a cutter carrying arm mounted adjacent said chuck, a cutter thereon, said cutter arm being pivoted to a supporting head, said head and cutter arm being freely removable from the machine as a unit, and automatic means for moving the cutter into and out of engagement with the said article.



Heavy Clay Products

Brick made from coal bearing schist. G. HERMANT. *Rev. Mat. Constr. Trav. Pub.*, 168, 209(1923).—Ground schist contg. 4, 6, and 8% carbon was made into brick by the sand-lime brick process with slaked lime in propns. of 4, 6, 8 and 10%. Satisfactory brick were made with schist contg. not more than 6-7% combustible carbon, and with 4-8% lime. The max. crushing strength of 120-130 kg. per sq. cm. was obtained with schist contg. 4% carbon, schist with 6% carbon giving 105 kg. per sq. cm. Porosity ranged between 8 and 11%. L. N.

Brick and tile works ("La Bédaricienne" at Bédarieux (Herault, France)). J. E. D. *Rev. Mat. Constr. Trav. Pub.*, 168, 161-6B(1923).—Description of plant, with 2 drawings and 4 photos. Two kilns are in service (1) a Hoffmann continuous kiln 43 m. long with chambers 2.60 m., having a coal consumption of 120-130 kg. per 1000 brick (5 x 11 x 22 cm.) with a daily product of 25,000. (2) a semi-continuous kiln 20 m. long, with chambers 3 m., producing 4,000 brick daily with a slightly higher coal consumption than (1). L. N.

Arlington building. LOUIS J. LARSON AND SERGE N. PETRENKO. *Bur. Stand.*,

Tech. Paper 236.—The hollow tile and reinforced concrete floors of the Arlington Building, Washington, D. C., were loaded and the deformations measured. This was, at the time, the first test upon this type of construction in which strain-gage meas. were taken. The floor slab was formed by rows of hollow tiles spaced 4 in. in each direction. The reinforcing steel was placed in these spaces and concrete poured around it and into the open ends of the tiles. The columns are steel H-sections surrounded by a thick casing of concrete. The beams and girders have steel I-beams encased in concrete. These beams are generally near the bottom and may be considered the tension reinforcement. The panels, having various ratios of length to width (from 1.05 to 1.86) were loaded with sand bags, separated by aisles to prevent arching, some up to 380 lb./ft.² The loading schedule was intended to produce max. positive and max. negative moments and to enable the study of the effect of transferring load to an adjacent panel. The max. stresses developed in the slab were about 27,500 lb./in.² in the negative reinforcement and 24,000 lb./in.² in the positive reinforcement. Both stresses were developed at the load of 335 lb./ft.² The stresses developed in the reinforcing I-beams of the girders were lower. The max. recorded compressive stress in the concrete was about 1,600 lb./in.² The distribution of the cracks in the concrete furnished an indication of the distribution of the stresses at an early stage of the test. The first cracks observed were diagonal ones on the bottom of the slab. They occurred at about the same time as the cracks on the top which extended across the corners and at right angles to those on the bottom. The cracking of the concrete was accompanied by a considerable increase of the stresses in the reinforcing steel. The study of the cracks and the stresses shows that in a test of this kind, the deformations, though measured at positions of max. moment, will fall far short of showing the max. stresses unless the gage lines are located across or very close to the principal cracks. Thus, in some cases, the stresses observed at positions of max. moment and at the gage lines crossed by cracks were 16,000 and 23,000 lb./in.², while stresses in gage lines 12 in. from the cracks were 4,000 and 5,000 lb./in.², respectively. The effect of time under load was very pronounced in the first 20 hours and comparatively small later. The effect of increasing the ratio of the length to the width of the panel was to increase the moments carried by the positive and the negative reinforcement in the short span and a corresponding decrease of the moments in the long span. The beams offered very little resist. to torsion and the stresses in the negative reinforcement across the beam were little affected by the transfer of load across the beam. The increase of the deformation in the reinforcement due to long continued loading was greater than that in the concrete. This probably was partly due to the assistance of the clay tiles in resist. the compressive deformation because of the clay tiles yielding less than the concrete. The moment coeff. are generally small due to the low stresses and are not proposed for use in design but to show the rel. amt. of bending moment carried in the 2 directions. From the comparison of these results with those obtained from tests of simple beams, it appears that the factor of safety of the construction is the greatest. H. F. S.

Remarkable new brick-making process. ANON. *Times Trade & Eng. Supplement* (London), 13, 133 (1923).—This new process consists in the thorough disintegration and drying of the particles of the mat. as a first opern. The saving of time is obvious, for after 15 min. the dried and finely granulated clay passes to a moistening device wherein a complete stirring, without compression, combined with a projection of fine particles of water, converts the dry clay into a pulverized mass which is perfectly and regularly moistened to the exact deg. required. The amt. is then led into hydraulic presses, and on leaving these a brick placed edgewise is of sufficient strength to support the wt. of 2 men standing upon it. The bricks are then baked, 80% being suitable for facing bricks. *Time:* One series of machinery can produce from

3,500 to 4,800 bricks per hour. *Labor:* The labor needed in the new process as compared with the old-fashioned wet process is as 7:22. *Cost:* The comparison of the approx. cost per thousand is as 13:21. The finished product has 50% more resist. to press., frost, and chipping. In matter of economy, this is a process by which brick and tile may be made, superior in quality, at a cheaper rate, with less labor and time; it is possible to make brick and tile from mats. which have hitherto been considered useless for such manuf.

O. P. R. O.

New invention for bricklaying machinery. ANON. *Times Trade & Eng. Supplement* (London), 14, 9(1923).—This new bricklaying mach. is in opern. on a large housing scheme in Glasgow. The average number of bricks laid per hr. is 1,300, as compared with the bricklayer's av., 800 per day. The mach. is known as the K erector, and consists of a traveling rail, by means of which the portion designed to lay bricks is enabled to travel in 2 directions, at right angles to one another. By this means a circuit of the outside walls is made, the mach. laying the bricks as it goes. A special device checks the opern. at door and window openings, and the internal walls are erected in the same manner as the outer walls. The laying wheel rotates, taking 2 bricks at a time from the hopper, the mortar measg. wheels spread the mortar, and the carriage moves along the overhead traveling rail, thus laying a row of bricks as it goes.

O. P. R. O.

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Clay-working machinery. ROY H. McELROY. U. S. 1,471,405, Oct. 23. The combination with a motor, of a shaft, belting connecting the motor and shaft, a pinion on said shaft, a second shaft, a gear on the second shaft, meshing with said pinion, an extrusion auger carried by the second shaft, an impeller positioned laterally of the auger and adjacent thereto, and means to drive the impeller from the second shaft.

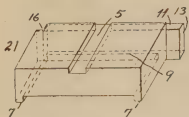
Method of forming interlocking bricks. JOHN T. ROBERTS and JESSE C. MARTIN, JR. U. S. 1,471,506, Oct. 23. The method of forming plastic clay into bricks with bosses and recesses, which bricks when laid with the bosses in the recesses form interlocking wall, consisting in taking a cut block of plastic clay of the same size that would normally form a pressed brick without bosses and recesses, and subjecting the block to press. in such manner that recesses are formed on one face of the block deeper than the height of the bosses on the opposite face by the displacement of clay from the recess side to the boss side of the block.



Process for applying vitreous and waterproofing coating to brick and burnt-clay articles. JOSEPH H. HINES. U. S. 1,471,792, Oct. 23. A process for applying vitreous and water-proofing coating to certain of the surfaces of burnt clay articles, consisting in first coating the surfaces of the articles which are not to be coated with the vitreous and water-proofing coating, with clay or kaolin, then baking the articles in a fur. to approx. a red ht. then withdrawing the articles from the fur., then sprinkling powdered vitreous and water-proofing compd. upon the surfaces of the articles which are not coated with the clay or kaolin, and allowing the ht. of the articles to melt or fuse the powdered vitreous and water-proofing compound and permit it to spread over and adhere to the surfaces of the articles which are not coated with the clay or kaolin, then allowing the articles to cool, and finally removing the clay or kaolin from the same.

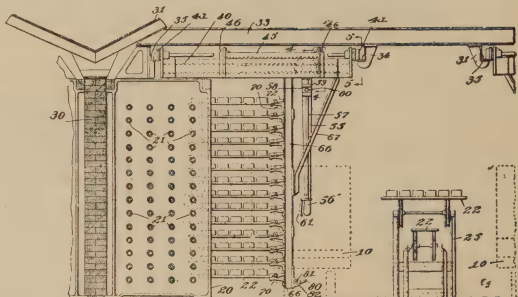
Interlocking building brick. JAMES HUNDLEY. U. S. 1,472,911, Nov. 6. A bldg. brick formed with a plurality of depending lugs in spaced relation to one another on one horizontal face of said brick, a vertical lug adjacent one end of said brick adjacent the exterior face of the brick, a vertical recess on the opposite end of said brick in alignment with said vertical lug, a transverse recess in the surface opposite said depending lugs and in spaced parallel relation to said depending lugs, a plurality of bonding

recesses on the interior face of the brick, said vertical lug projecting to a greater extent than the depth of said vertical recess, and said depending lugs projecting to a greater extent than the depth of the transverse recess, a longitudinal depending lug in alignment with said vertical lug and connecting one extremity of said first mentioned depending lugs adjacent the exterior face of the brick, a longitudinal recess on the opposite edge of said exterior face so positioned that when a series of said brick are laid together to form a wall the exterior face of said wall will form a continuous smooth surface while the interior face will possess spaced recesses



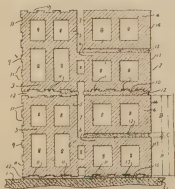
between adjacent bricks, except where said lugs engage said recesses, essentially as and for the purpose described.

Brick-pallet-handling apparatus. GRAFTON E. LUCE. U. S. 1,473,305, Nov. 6. Apparatus of the kind described, comprising a movable support, a plurality of clamps carried by said support, said clamps being spaced approx. equal to the distance be-



tween the pallet receiving pipes in a steam pipe drier, and means for moving the clamps to engage and hold a plurality of pallets under substantially equivalent holding tension.

Building tile. CHARLES H. TOFFELMEYER. U. S. 1,475,092, Nov. 13. A wall structure comprising main tiles and a filler tile associated with each main tile, each filler tile situated within a recess in a main tile, the tiles being so formed that the cross-section of each pair of assembled main and filler tiles is rectangular.



Refractories

Refractory materials of the London Basin. HENRY DEWEY. *Trans. Ceram. Soc.* (Eng.), 22 [1], 38(1922-23).—By the London Basin the geologist means that part of the S. E. of England which is practically the same as the Thames Basin. The chalk supplies very little mat. of a refrac. nature. Of the Tertiary beds the Thanet sands supply mats. used in the manuf. of lime-sand bricks, and as casting and molding sands. The most remarkable deposit consists of loamy sand of a greenish grey to white tint and varies in thickness up to 5 ft. Refractory wares, used at many of the London and other gasworks, are made from this material. The principal brick-earths form wide-spread tracts at about 90 ft. and 50 ft., respectively, above sea-level. Most of the large brick fields, which formerly supplied London with its bldg. bricks, were in the alluvial brick-earths.

H. F. S.

Effect of salty clay upon refractory materials. L. M. WILSON. *Chem. and Ind.*, 42, 1009(1923).—In a paper read before the Ceramic Soc. (London), Oct. 4, W. said: After he had investigated the action of ammonium chloride, which is found in coke-oven gas from salty coal, he concluded that: (1) There is a critical temp. at about 900°C, at which the chem. properties of burned fire clay seem to undergo a change, quite apart from the critical temps. at which the phys. properties of either raw or fired mats. are known to alter. Below this temp. very little alumina is removed, and above it a great deal of alumina is removed by the action of htd. ammonium chloride. (2) The exptl. evidence demonstrated the superiority of high-grade silica over fire clay for the lining

of coke ovens as regards resist. to salty coal. (3) At temps. from 700°C to 1200°C and higher, ammonium chloride removes iron and alumina from fire clay and from silica bricks.

O. P. R. O.

Sillimanite: a high-grade refractory. ANON. *Bull. Imperial Inst.*, **21**, 383(1923).—It is found commonly in gneisses and cryst. schists and in detrital rocks derived from them, usually disseminated in grains or aggregates of fibres. Recently it has been found in India in the massive variety which is very rare. The deposit is in the Khasia Hills of Assam and is in the form of boulders. Experimental work is being carried on by the Imperial Inst. as to its value as a high grade refrac. mat. and if it is successful an attempt will be made to overcome the difficulties of transport and place it on the market. Its valuable properties as a refrac. are strength and toughness, high m. p. (about 1810°C) and stability up to that temp., low coeff. of expansion, low elec. condy., freedom from vol. changes, neutral reaction, and resistivity to corrosive slags and to oxidizing and reducing conditions. Its use is still in the exptl. stage. The Amer. Refrac. Co. in conjunction with the Mellon Institute have also carried out expts. along this line. Though its first cost would be higher than that of less refrac. mats. it is probable that its greater durability will more than compensate for the difference.

O. P. R. O.

The importance and future of the German graphite output. E. H. SCHULTZ. *Chem.-Ztg.*, 685(1923); cf. *C. A.*, **17**, 3074.—The Bavarian graphite production increased from 4,000 tons in 1907 to 36,000 tons in 1918, while the Austrian production fell from 50,000 to 32,000 tons, and that of Ceylon from 35,000 to 22,000 tons during the same period. Between 1891 and 1913 German imports rose from 13,000 to 44,000 tons. Because of excellent methods of treatment it is claimed that the local (German) varieties of prepd. graphite are superior to those obtained from other sources, chiefly because they come in flakes rather than in powder form.

W. C. E. (*C. A.*)

Refractory materials for the construction of furnaces. THOMAS. *Giesserei-Ztg.*, **10**, 235-7(1923).—Unreliable results are obtained in the detn. of the refrac. quality of a mat. by the Seger cone method, because the stone softens at much lower temps. Far superior is the method of Endell (no reference). The valuation of mats. by this method and their use in fur. construction are discussed.

C. C. D. (*C. A.*)

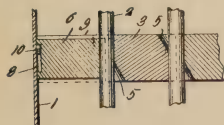
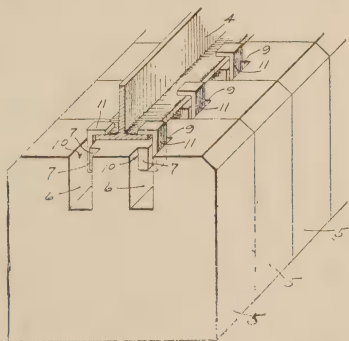
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Refractory article. EDWIN B. FORSE. U. S. 1,473,286, Nov. 6. A refrac. article contg. silicon carbide grains having its surface pores filled with finely divided silicon carbide.

Furnace arch. CLARENCE A. STRACHOTA. U. S. 1,472,945, Nov. 6. The combination with a flanged beam and a block structure in which said blocks are formed with pockets having undercut ledges forming contracted throats of block hangers arranged in opposing pairs and having outer flanges slidable on the beam flange and having inner flanges slidable under the undercut edges of the blocks.

Baffle brick. FRANK H. WAITE. U. S. 1,473,132, Nov. 6. In combination, a pair of

walls, a plurality of bars situated between the walls, a plurality of bricks supported between the bars, each brick provided with channels at its ends, said channels being deeper at one of their ends and said deeper portions being diagonally disposed in relation to the bricks, and a plurality of bricks situated between the bars and the walls,



fracture etc., with photographs of body and glazes of Royal Worcester Lab. Porcelain
O P. R. O.

A study of factors involved in slip-casting. S. R. HIND. *Trans. Ceram. Soc. (Eng.)*, 22 [1], 90(1922-23).—The general effect of alterations on the nature (quality) of the casting are: less alkali in the slip; higher slop weight; and lower temp.; all seem to operate in the same direction, *i. e.*, to give a softer, more plastic and thicker casting. H. F. S.

Atmospheric conditions in potters' shops and the efficiency of various types of drying stoves. H. M. VERNON. *Trans. Ceram. Soc. (Eng.)*, 22 [1], 70(1922-23).—The high temps. appear to have been due largely to the wishes of the potters themselves. There can be little doubt that they render themselves more susceptible to cold. The very great mortality of potters from phthisis and other respiratory diseases is generally attributed to the inhalation of pottery dust, but it may be due in no small degree to the high temp. and lack of ventilation. The potters' shops investigated were badly under-ventilated. The humidity of the air in potters' shops is approx. the same as that observed in other shops.
H. F. S.

Some experience with the Dorr mill in grinding quartz and flint for pottery purposes. A. S. W. ODELBURG. *Trans. Ceram. Soc. (Eng.)*, 22 [1], 1(1922-23).—The mat. is first crushed by means of an ordinary stone breaker fitted with a screen of about 1 cm. mesh, the fragments, not passing through being automatically returned to the crusher by means of an automatic conveyor. Ten tons are crushed in about two hours. This crushed mat. is now conveyed to a hopper with a capacity of about 10 T. At the bottom of this hopper is an automatic disk-feeder which can be adjusted to deliver the exact amount required. This continuously feeds the mat. into a trough where it is moistened and intimately mixed with semi-ground mat. returning from the plant. A scoop feeder, fixed on the rotating shaft of the tube mill, gradually works this mixt. into the mill through the hollow shaft by means of a worm. The mill is lined and filled with pebbles in the usual way. At the other end of it there is a hollow shaft, also provided with a worm, which both retains the pebbles and discharges the partly-ground pulp. A strong jet of water pushes this material into what, in the mining industry, is called a launder, which is simply a wooden trough. The pulp, being very much diluted, runs quite freely by gravitation through this trough into the classifier, in which, by means of rakes, the coarsest mat. is returned to the scoop-feeder to repeat the same round, while the finer pulp flows over into a sump, from which it is lifted by a centrifugal pump to the story above into a tank filled to the very top with water. This tank is called a hydro-separator. The coarser pulp runs out at the bottom through an adjustable tap, and it is divided into two parts, one returning to the launder mentioned above, and the other part to the scoop feeder trough to provide the requisite moisture to the material before entering the mill. The finer pulp flows over the brim of the hydro-separator in a fine film and then passes through a 130-mesh lawn to remove any particles of wood or coal dust. The amt. is very small, the lawn requiring to be cleaned only once in 12 hrs. The fine pulp now gravitates through a trough into the middle of what is called the thickener, which is a round tank of 16 ft. diameter and about 10 ft. high, filled to the very brim with water, the top edge being dead level all round. Between this and an outer edge is a groove 3 or 4 in. deep, and of the same width, to collect the overflow. This groove is, at a certain point, connected with a pipe which conducts the overflow of practically pure water to the point where it forms the jet, which forces the pulp coming out of the tube mill into the launder and so to the classifier. Thus the circuit is completed, the same water being used over and over again, apart from what remains in the finished slop mat., which is run off through a tap from the bottom of the thickener and conveyed by gravitation to the flint ark. To replace the water going away with the finished material into the flint ark, a small jet of water from the main runs into the

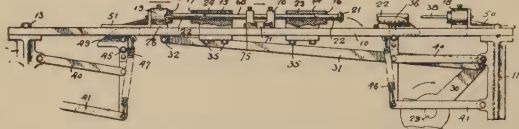
launder at the discharging end of the tube mill. The rate of grinding at present is about 7.2 T. per 24 hrs. or about 11 lbs. per min., dry wt. The thickness of the pulp as it leaves the tube mill is 1.6 sp. gr. or 32 oz. to the pint. To retain this precise thickness is of the greatest importance, as it makes for the smooth working of the mill. To make it thicker would reduce the output, as the flint pebbles then get clogged in the stiff material, and fail to do their work, the actual grinding then only taking place in contact with the lining. It will not do to dilute the slop mat. in the mill too much, as the pebbles then sink to the bottom, do not mix with the mat. and punish the lining. Should a coarser mat. be required, say particles under 0.01 mm. 52%, particles between 0.01–0.025 mm. 34% and particles from 0.025–0.04 mm. 14%, which is generally used in the potting trade, the output can easily be increased to about 10 T. in 24 hrs. H. F. S.

Continuous grinding. C. J. MOLLER. *Trans. Ceram. Soc. (Eng.)*, **22** [1], 12 (1922–23).—The hard raw mats., flint, feldspar, stone, etc., are first crushed in an ordinary jaw crusher. The preliminary crushing plant runs automatically without any attendance until the bin is empty. From the feeding device the mat. enters a roller mill, crushed to pass mesh No. 10, passes a magnetic separator and a rotary sieve. The hard mats. are weighed out from the different bins in the correct propns. for one charge of the mill, and ground down for about 2 hours with the necessary amt. of water. The soft mats. (clay, china clay, etc.) are filled in, and all the raw mats. are ground together for a quarter of an hr. to $1\frac{1}{2}$ hr., after which the whole contents of the mill are emptied out as ordinary slip. From the mill the mat. passes over a magnetic separator and a control screen where impurities are retained, and from here we ordinarily run the slip down into big, reinforced concrete hoppers, where it is stored for some time, as it appears that a maturing of the slip takes place when it is kept as a well-ground mixt. for some time in big storage basins. To avoid pptn., the slip is kept agitated from time to time by means of compressed air blown through it. The filter pressing takes place in the foll. way: The slip runs by gravity from the reinforced concrete hoppers down into sheet iron receivers, from which it is forced into the filter presses by means of compressed air. In filter pressing by compressed air, the necessary time is reduced to about half the time ordinarily required for this operation, and at the same time the compn. of the filter press cakes becomes more even, as no blows from a piston reach the slip; and further, the durability of the filter cloths is prolonged, as the blows from filter press pumps seem to have a bad effect on them. H. F. S.

PATENT

Machine for heading porcelain tubes and the like. ALBERT G. MASON and LO-

RENZO C. BUCKLEY. U. S. 1,471,907, Oct. 23. In a tube-heading mach., a stationary die, a movable die coöperating therewith, a feed table adapted to support a tube blank in substantial align-



ment with said dies, and means associated with the movable die for picking up the blank from said feed table and introducing it into the stationary die, together with means for depressing the feed table and holding it depressed during the working travel of the movable die.

Equipment and Apparatus

Drying refractories or other goods. J. HOLLAND and W. J. GARDNER. *Chem. & Ind. (London)*, **42**, 1008 (1923).—Improvements in drying refrac. and other goods was subject of a paper read before the Refrac. Mats. Sec., Eng. Ceram Soc., held at

Chester in Oct. This relates to a tunnel drier with traveling racks, with a hot zone 60 ft. long and 3 ft. wide, a longitudinal flue beneath, heated by means of a fur. or by the ht. from waste gases. The flue communicates with two longitudinal lateral flues, one on each side which lead to the chimney stack over the front end of the drier. Continuous with the hot zone is a cooling chamber 10 ft. long. Two parallel steel tracks containing steel rollers extend the whole length from feeding end to delivery end of the drier. As compared with hot-floor drying it is claimed that with this system conditions for workers are better and the goods of higher quality. Much time is saved, and a very much smaller area is required for a given output of silica bricks or other goods. The stove of 2 chambers described can dry 5000 bricks per shift of 9 hrs., using 4 cwt. of coal.

O. P. R. O.

The Proctor drier. A. H. MIDDLETON. *Chem. and Indus.* (London), **42**, 1009 (1923).—The Proctor drier is essentially a close heated chamber, the atm. of which is dry at one end and very humid at the other. The wet goods are thoroughly heated to their core in a very humid atm. before any surface drying can take place. The mach. at Consett is a 3-track tunnel drier consisting of a rectangular chamber 50 ft. long, 20 ft. wide and $6\frac{1}{2}$ ft. high, holding cars on each of the 3 tracks, and having a total capacity of 14,976 bricks. If bricks alone were being dried, the drying could be completed in 12 hrs., and probably in 8 hrs. Economical results can be obtained by working the different tracks on different schedules for diff. classes of goods, though of course the best results would attend the drying of one class of goods at a time. Advantages claimed for the Proctor drier, as compared with hot floor, are that drying—especially of difficult shapes—can be carried out much more quickly and with less risk of cracking and setting up drying strains, that the conditions in the molding shop can be made much more healthy and pleasanter for the workers and that a large saving in fuel can be made, excepting when ht. for drying can be provided from exhaust steam or some source that could otherwise be utilized. (Paper read before the Ceramic Soc. of London, Oct. 4.) O. P. R. O.

Metallized electrodes of porous porcelain and the simplest form of the acid alkali cell. K. A. HOFMANN. *Ber.*, **56B**, 1456–63 (1923).—Cells have been constructed in which porous porcelain tubes metallized with Pt, Pd, or Ir serve both as a gas electrode and diaphragm. If the metallized porcelain tube is designated as *plr*, *pdr*, or *irr*, the 2 N NaOH as *l*, the 2 N H₂SO₄ as *s*, the platinized Pt electrode by *pt*, and the tubes satd. with acid or alkali by *ptrs* and *ptrl*, then the cells' e. m. f.'s are as follows: H₂-*ptrs-l-pt*-H₂, with acid satd. tube dipped in alkali, 0.72 v.; H₂-*ptrl-s-pt*-H₂, with alkali satd. tube dipped in acid, 0.72 v.; O₂-*ptrs-l-pt*-H₂, 1.58 v.; O₂-*pdrs-l-pt*-H₂, 1.55 v.; O₂-*irrs-l-pt*-H₂, 1.74 v.; H₂-*ptrl-s-pt*-O₂, 1.75 v.; H₂-*pdr-l-s-pt*-O₂, 1.705 v.; H₂-*irrl-s-pt*-O₂, 1.79 v.; and O₂-*irrl-s-pt*-H₂, 0.32 v.

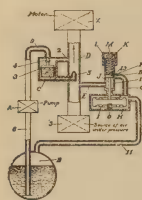
D. MACR. (C. A.)

Quartz glass ozonizers. HEBERT FISCHER. *Z. Elektrochem.*, **29**, 318–20 (1923).—Under similar standard conditions the O₃ concn. in the quartz ozonizer is considerably less than in a glass ozonizer. The low concn. of O₃ cannot be ascribed to the transparency of quartz to short-wave radiation, for such radiation has not been detected on the outside of the quartz glass ozonizer. Under similar exptl. conditions quartz and glass ozonizers of the same dimensions yield the same O₃ concn. with a Tesla current. Accordingly, the elec. losses in quartz glass have an appreciable influence on the O₃ concn. From this it is concluded that these losses depend largely on the applied frequency.

H. J. C. (C. A.)

PATENTS

Means to maintain a suitable pressure in the liquid-fuel-storage tanks of airplanes. AUGUSTE CAMILLE EDMOND RATEAU. U. S. 1,471,417, Oct. 23. In a fuel feeding device for a flying mach. propelled by a supercharged motor means to control the press



in the fuel tank which consists in reducing the press. of the air under press. delivered to the motor and applying said reduced press. to the fuel tank.

Process of producing porous material. MATHIAS OVROM SEM.

U. S. 1,471,421, Oct. 23. The process of producing a porous mat. from molten slag, which comprises continuously leading the molten

slag into a container at a temp. of approx. 1400°C, introducing water and a gas therein, subjecting the molten slag and the water to agitation whereby a foam is produced, the introduction of the water being regulated in such manner that the temp. of the foam will be approx. 1000°C, continuously leading the foam into molds and cooling the same to solidification whereby the foam structure is preserved.

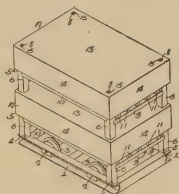
Truck for drying pottery, etc. THOMAS

H. RHOADS. U. S. 1,472,676,

Oct. 30. The combination of

a tray having slats thereon to support the articles to be dried;

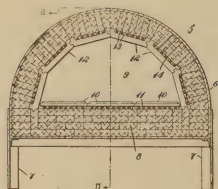
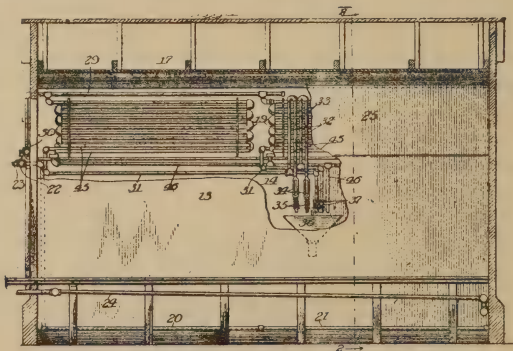
and a flanged cover extending over the articles and to a point at, or near, the upper surface of the tray, so that heated air, in circulation, will pass up between the slots and the upper portions of the articles will be protected.



Dry kiln. JOSEPH F. HAN-

RAHAN. U. S. 1,471,602, Oct. 23.

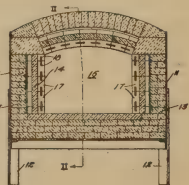
In a dry kiln the combination of a drying chamber, a condensing chamber having condensing means therein, heating means and a humidifier, the humidifier arranged between the condensing and heating means, all coöperatively arranged to cause a circulation of air currents from the drying chamber to the condensing chamber, and said humidifier having means for regulating the same.



Electric-resistance furnace. THOMAS A. REID. U. S. 1,472,137, Oct. 30. An elec. fur. comprising a plurality of spaced-apart sets of refractory resistor-supporting plates combined to form substantially self-supporting arches, the plates in each set having interfitting tongue-and-groove edges, and directly supporting an elec. resistor.

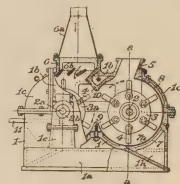
Electric furnace. THOMAS A. REID.

U. S. 1,472,139, Oct. 30. In an elec. fur. in combination, a plurality of walls spaced apart to enclose a furnace chamber, a plurality of spaced sets of refractory members of T-shape, having



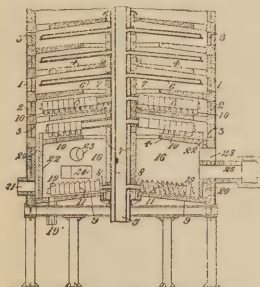
their narrow ends projecting into said chamber and each having a transversely extending slot in each of 2 opposite faces, and a resistor member extending through said slots and between and beyond said sets of refrac. members.

Pulverizing machine. STANTON C. MARTIN. U. S. 1,472,609, Oct. 30. A pulverizing mach adapted for either fine or coarse work, comprising a double semi-cylindrical casing, parallel rotary hammers in said casing, a mat. inlet pipe leading into one part of the casing, said part having also a discharge outlet, a deflector at the top of the casing between the two parts thereof, and a removable perforated screen over said outlet, through which coarsely pulverized mat. is discharged, the hammers in this case being rotated in opposite directions.



Protecting electrodes passing through fire-brick walls. E. A. A. GROENWALL. Swed. 53,757, Feb. 14, 1923. The electrodes are cooled at those sections that pass through the wall. Extra cooling segments are placed on the wall outside the layer of bricks immediately surrounding the electrodes.

(C. A.)



Calcining apparatus. ROBERT D. PIKE. U. S. 1,472,935, Nov. 6. A calciner for the described purpose, the same comprising an outer shell, a series of superposed hearths arranged therein in staggered relation, a series of rabble arms associated with and movable over each of said hearths, a rotatable column carrying said arms centrally extended through the shell, a bottom hearth for the shell situated below the lowermost hearth of the series of hearths a distance in excess of the distance between said hearths to provide an enlarged combustion chamber, means for admitting combustible fuel and air for supporting combustion within the said chamber, a series of rabble arms carried by the rotatable column and movable over the bot-

tom hearth of the calciner for advancing calcined mat. to a discharge outlet, and a plow-shaped rabble tooth covering for each of the rabble arms associated with the said bottom hearth.

Kilns, Furnaces, Fuels and Combustion

Surface combustion and its application. W. M. HEPBURN. *Assoc. of Iron and Steel Elec. Engrs.*, 5, 497-512(1923).—H. discusses the principles of surface combustion and its application to specific furs. The practical utility of combustion involves 3 considerations: (1) the combustion, (2) the furnace, (3) the supply systems. Surface combustion is accomplished by firing an accurate and intimate mixt. of air and gas in a multiplicity of minute intensely hot combustion chambers (under-fired refrac. beds or refrac. diaphragm burners), causing rapid combustion. Such combustion causes large increase in ht. transmission. The desired characteristics of surface combustion equipment are discussed; these include: (1) correct and constant ratio of air and gas; (2) intimate mixing of air and gas; (3) a restricted and definite controlled zone of combustion. Automatic proportioning for maintaining control of the combustion zone is accomplished by the refrac.-bed type and the tunnel type of firing. The intense temp. is obtained in both by localizing the zone of combustion; in the refrac.-bed type the mixt. of gas and air is impinged upon a bed of refrac. granules, and in the tunnel type the zone is localized by sudden expansion in a molded tunnel. The hot surfaces of the granules or tunnels have an accelerating effect on the speed of combustion. In the refrac.-bed type, the burner projects the mixt. into a pocketed bed of refrac., which can be any sub-

stance capable of withstanding temps. over 3400°F, while in the tunnel type, an accurately molded minimum size combustion chamber lined with cement, also capable of withstanding over 3400°F, is used. By minimum size is meant the smallest possible space in which the mixt. capacity of the particular burner can be burned. Examples with figures are given showing the application of these two types to particular furs. The refrac.-bed type has been applied to steel heat-treating furs., and the tunnel-type to pot melting furs. Stacks are used with surface-combustion systems only as passages for flue gases; no draft is required. Pressures required are 1 lb. for producer gas, 8 lbs. for coke-oven gas, and 20 lbs. for natural gas, where compressed gas is used. Some htg. operations are best performed by surface combustion, while others are better carried out by regenerative and recuperative methods.

R. J. A.

Oil firing of ceramic kilns. SYMPOSIUM. *Ceramist*, 3, 77-114(1923).—F. W. WALKER. Average coal consumption for 73 16-ft. downdraft kilns burning wall tile to cone 10 was 12.8 tons of coal; gas consumption for these kilns 360,000 cu. ft. If the coal is considered as having 14,000 B. t. u. per lb. and gas 1000 B. t. u. per cu. ft. and assuming equally efficient combustion conditions, this shows a thermal variation of less than $1\frac{1}{2}$ of 1%. A smaller updraft kiln 10 ft. 6 in. diameter showed a coal consumption of 8.85 T. as compared with 269,000 cu. ft. natural gas, the thermal consumption being 8.56% greater with gas than with coal. In comparing the consumption of gas with oil when burned in a Dressler tunnel kiln fired to cone 1 over a considerable period and considering the oil as having 142,000 B. t. u. per gallon 20% more oil fuel is used. This agrees closely with the experience of 2 other companies where direct comparisons have been possible. Improvements in designs and operation of furs. will probably reduce this apparent difference. *Comparison of costs:* Assuming the thermal efficiency of these fuels to be the same, a comparison of burning costs including labor, maintenance and sagger breakage charges is made. For this purpose 28,000,000 B. t. u. (the equivalent of one ton of coal of 14,000 B. t. u. per lb.) is taken as a basis of comparison which figure corresponds to 197 gallons of 28 Bé. Penn. oil (thermal value 142,000 B. t. u. per gallon) 28,000 cu. ft. natural gas (thermal value 1000 B. t. u. per cu. ft.). The total costs for one month are given below. Author states costs given for oil are based upon experience of others together with limited personal experience.

Expressed in per cent:

| | Coal | Gas | Oil | | Coal | Gas | Oil |
|-----------------|---------|---------|---------|-----------------|-------|-------|-------|
| Cost of fuel | \$6.05 | \$12.60 | \$12.25 | Fuel | 46.2 | 83.5 | 78.2 |
| Labor cost | 2.72 | 1.04 | 1.04 | Labor | 20.4 | 6.9 | 6.6 |
| Maintenance | 1.42 | .24 | .87 | Maintenance | 10.8 | 1.6 | 5.5 |
| Sagger breakage | 2.95 | 1.22 | 1.53 | Sagger breakage | 22.6 | 8.0 | 9.7 |
| <hr/> | | | | <hr/> | | | |
| Total | \$13.14 | \$15.10 | \$15.69 | Total | 100.0 | 100.0 | 100.0 |

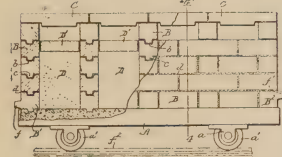
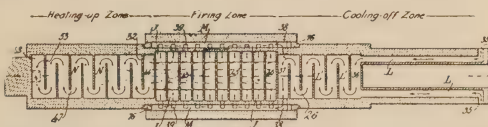
The av. compar. values of the 3 fuels for 25 months are as follows: Oil, \$16.59, 129.2%; Gas, \$15.25, 118.8%; Coal, \$12.84, 100.0%. W. discusses fuel storage, labor and control devices and the effect of these fuels upon the quality of the finished ware. With respect to the latter he is of the opinion that with very few exceptions equal results may be had with each fuel. J. A. WILLIAMS discusses the use of oil fuel in a plant engaged in the manuf. of a white vitrified body burned to cone 12 in one fire. The costs of oil burning equipment are given. A 13-ft. kiln using 6 burners with average burn of about 44 hrs. used about 1760 gals. of oil for each burn. A 14-ft. kiln having a greater height than the kiln previously referred to and having 8 burners uses about 2300 to 2400 gal. of oil per kiln for a burn of about 42 or 44 hrs. duration. Best grade of fuel oil obtainable is used. It has specific

gravity of 36 to 49° Bé. DONALD HAGAR describes the equipment of a low pressure system in use on kilns burning wall and floor tile to cone 10. It has been found that the cost is slightly more to burn bisque kiln with oil than with coal. Also, the data obtained in another plant of the same company shows that oil fuel costs from \$15 to \$20 less per kiln than natural gas at 45c per 1000 cu. ft. The oil used has a thin asphalt base with a specific gravity of 24° to 28° Bé. which is very satisfactory for use in cold weather. R. L. CLARE describes the use of fuel oil in burning terra cotta kilns. The equipment required is stated and theoretical advantages of oil are discussed. No factory data is included. F. N. TUCKER describes the use of fuel oil equipment in a terra cotta plant. No factory data is given. C. W. P.

Growing use of oil fuel in ceramic plants. ANON. *Ceramist*, 3, 111(1923).—A short list of plants using oil fuel is given and the statement is made that the National Porcelain Works, at Sevres France, is using oil fuel. This has made possible a reduction of the period of burning from 25 hrs. required for wood fuel to 16 hrs. for oil. It is stated that the oil-fired ovens have given ware of a purer and more uniform color. C. W. P.

PATENTS

Tunnel kiln. LOUIS A. WITTE. U. S. 1,471,875, Oct. 23. A tunnel kiln comprising a continuous lining forming a tunnel chamber and an enclosing masonry structure forming an intervening space divided by transverse partitions, said structure having a central zone with combustion chambers, a heating-up zone with flues for the circulation of combustion gases through such space around the chamber, and a cooling zone with air flues for heating air for combustion purposes by means of the heat transmitted through the walls of the chamber.



Tunnel kiln car. HARRY D. LILLIBRIDGE. U. S. 1,473,152, Nov. 6. In a vehicle of the class described, a load-carrying structure embodying bricks or slabs provided on their meeting faces with mortices and tenons, said bricks or slabs being interlocked and bonded to preclude dislodgment of the bricks under the stresses of the load and upon disintegration, more or less, of the bonding medium.

Geology

Silica in Canada; Its Occurrence, Exploitation and Uses. L. HEBER COLE. Pt. I. Eastern Canada. Canada Dept. of Mines. Ottawa: Government Printing Bureau. 126 pp. (C. A.)

Prepared non-metallics (Consumption and possibilities of development). S. J. COOK. *Can. Chem. & Met.*, 7, 226(1923).—This review gives a summary of an investigation conducted by the Dominion Bur. of Statistics with a view to determining the consumption in Canada of prepared non-metallics. The list of minerals covered was as follows: Actinolite, arsenic, asbestos, barytes, calcite, whiting, chromite, corundum, magnesite, magnesium sulphate, manganese, mica, nitro-alunite, iron oxides, phosphate, pyrites, silica or quartz, sodium sulphate, talc and tripolite. The fields of use covered are as follows: fertilizers, medicinal and pharmaceutical preps.; explosives, fireworks and matches; paint and soap industries; inks, dyes and colors; polish and dressings, pottery, stoneware, porcelain and enamelware, tanneries, artificial abrasives,

asbestos products, rubber industry, oilcloth and linoleum, roofing and wallpaper. All have detailed tables of statistics and form a very fine report. O. P. R. O.

Physics and Chemistry

Mechanical testing of finished ceramic products. M. GARY. *Sprech.*, **56**, 429-33 (1923).—Methods for testing true sp. gr. and apparent sp. gr. are described. The absorption is detd. by saturating the test pieces under press. with H_2O . Methods for detg. the apparent porosity and true porosity are also described. Laminations are detected by means of a magnifying glass. The degree of vitrification of elec. porcelains are detd. by subjecting test pieces in a soln. of fuchsin in methyl alcohol to a pressure of 15 atms. When subjected to this test the dye should not color the specimen. A water soln. of brilliant green may be used in the place of the extremely poisonous methyl alcohol soln. Special briquettes are described for measuring the tensile strength. Cross-breaking tests are made on 16 mm. by 120 mm. test pieces and the modulus of elasticity is detd. while making this test. For testing the resist. of porcelains to impact the pendulum methods are employed. The compression strength is detd. by means of a hydraulic press. The hardness of ceramic bodies is determined by means of a sand blast. This is allowed to act upon the body 2 mins. and the loss in wt. is used as a means for comparing different wares. H. G. S.

Effect of alkalis on clays and clay products. ANON. *Ceramist*, **3**, 48-55 (1923).—A brief résumé of our knowledge regarding the influence of sol. salts upon the amt. of water of plasticity, the working properties of clay, its drying shrinkage, drying behavior, and faults attributable to the presence of sol. sulfates in pottery bodies as well as brick. A gravimetric method for the detn. of sol. salts is given in detail with reference made to the use of an elec. method. C. W. P.

Notes on the crystalline structure of some china clays examined by the X-ray powder method. WILLIAM BRAGG, G. SHEARER AND J. W. MELLOR. *Trans. Ceram. Soc. (Eng.)*, **22** [1], 105 (1922).—In practice, it is convenient to use a fine slit $1/2$ mm. wide and 1 cm. long to define the X-ray pencil. The photographic plate will then show, if it is limited to a strip a little wider than the length of the slit, a series of fine lines, like an optical spectrum, and each such set of lines is unique and belongs to one crystal only, or to an agglomerate of crystals. H. F. S.

Forces of adhesion in solution. II. Coagulation of coarse suspensions. SERGIUS WOSNESSENSKY. *Kolloid-Z.*, **33**, 32-4 (1923); cf. *C. A.*, **17**, 1572.—The coagulation by common electrolytes of coarse suspensions of kaolin, $Al(OH)_3$, and Sb_2O_3 was studied. No single electrolytes, with the exceptions of $Ca(OH)_2$ and $Ba(OH)_2$, had any coagulating effect. Marked coagulation occurs with the simultaneous action of bivalent or trivalent metal salts and caustic alkalis, e. g., $BaCl_2$ and $NaOH$, or $AlCl_3$ and $NaOH$. These materials form difficultly sol. hydroxides, which are adsorbed on the surface of the particles of the suspension and cause coagulation by changing the forces of adhesion and cohesion. Materials such as NH_4Cl and tartaric acid which hinder the formation of hydroxides disturb the coagulation. The thickness of the absorbed hydroxide is estd. to be of mol. dimensions. C. B. E. (*C. A.*)

Experimental studies of the coagulating powers of electrolyte series. AGNES IVANITZKA AND L. ORLOVA. *Kolloidchem. Beihefte*, **18**, 1-38 (1923).—The coagulating powers of several series of electrolytes were studied with the following hydrosols: negative—mastic, sulfosols of As_2S_3 and Sb_2S_3 , S, Au, Pt, Berlin blue, MnO_2 and $Fe(OH)_3$; positive— Fe_2O_3 , Al_2O_3 , Cr_2O_3 and $AgBr$. In general, the anion series with a const. cation is antivalent for negative sols and convalent for positive sols, whereas the cation series with a constant anion is convalent for negative sols and antivalent for positive sols. Comparative studies of electronegative suspensions of coal in alkaline media

and electropositive suspensions of Fe_2O_3 in acid media were made with true sols and on marked differences were observed in their ability to coagulate by electrolytes. The following substances were added to the dispersion medium of the suspensions to determine their effect on their coagulation by electrolytes: MeOH, AcH, glycerol, Na protalbinat, dextrin and gelatin. Nonelectrolytes affect the stability of the suspensions as well as the rearrangement of the electrolyte series in their coagulating powers. Coagulation is considered to be not simply the result of physical factors, *i. e.*, surface tension, dielec. const., etc., but of relations among all components of the coagulating system, *i. e.*, disperse phase, dispersion medium and electrolytes. I. N. K. (C. A.)

The transition in case of mechanical subdivision of crystalline hydrates of the water of hydration into adsorbed water. T. HAGIWARA. *Kolloid Z.*, **32**, 154-6(1923).— $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ and quartz dried to const. weight were ground in a *colloid mill* and then kept at higher temps. in the desiccator. Weighing showed that at a sufficiently fine state of subdivision of $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ its water of hydration loosens its firm bond and assumes the properties of adsorbed water. (C. A.)

Physical chemistry of the crystalline state. F. KÖRBER. *Z. Elektrochem.*, **29**, 295-301(1923).—An address on X-ray analysis and the study of solids. H. J. C. (C. A.)

Fusion, solution and ionization. W. F. SHORT. *N. Zealand J. Sci. Tech.*, **5**, 43-5(1922).—A short discussion in which these phenomena are considered as essentially the same and explained on the basis of radiation hypothesis. A. E. S. (C. A.)

Acid borates of sodium. I. F. PONOMAREV. *J. Russ. Phys. Chem. Soc.*, **49** [1], 229-40(1917).—By employing the principle established by Tammann (C. A., **8**, 2971) P. succeeded in prepg. cryst. borates contg. a greater proportion of B_2O_3 than that in borax ($\text{Na}_2\text{O} \cdot 2\text{B}_2\text{O}_3$). This was accomplished by htg. fused mixts. of borax and anhyd. B_2O_3 in a Pt boat placed horizontally inside of a hard-glass test-tube. The heating being restricted to one end of the boat, a slowly falling temp. gradient was obtained along the fused mass, and the crystn. of the desired borates started at the point possessing the optimum temp., which lay in the middle region between the molten fluid at the heated end and the solid vitreous portion at the cold end. Since at the temp. of formation of the cryst. nuclei the mixt. is extremely viscous and the motion of the crystals very slow, it was possible to measure, with a thermocouple, the limiting temps. of the cryst. formations. Chem. and crystallographic studies were made of mixts. of the oxyborates $\text{Na}_2\text{O} \cdot 3\text{B}_2\text{O}_3$ and $\text{Na}_2\text{O} \cdot 4\text{B}_2\text{O}_3$ so obtained. W. A. P. (C. A.)

The third principle of thermodynamics and some of its consequences. A quantitative application of Berthelot's principle. VL. A. KISTYAKOVSKII. *J. Russ. Phys. Chem. Soc.*, **53**, I, 247-55(1921).—A quant. formulation of Berthelot's principle of *maximum work* was made which permits of broad applications to the detn. of such quantities as the heat of transformation, the free energy of compds., etc. A restatement of Berthelot's principle is briefly given as: "For every transformation of substances, chem. or phys., a characteristic point may be found by varying the temp. and pressure at which point $A_1 = Q_1$, *i. e.*, the free energy = the heat of transformation, and at the same time $dA/dT = 0$, or, when the 1st deriv. of the free energy to the temp. (the temp. coeff. for the given point) is also = 0." Nernst's theorem presents a special case of the above postulate, namely where $T = 0$. The application of the above principle also leads to the equation $q = T(dA/dT)$, where q is the heat of the side process accompanying the chem. reaction. This leads to the condition in which with small increase in temp. Q becomes either greater or less than A . By using the last equation the temp. coeff. of galvanic elements can be calcd. from the heats of fusion of ice and Hg. It also gives a simple formula for the latent heat of vaporization of poorly associated liquids (cf. following abstr.). The general problem of the max. work which can be obtained from any given reaction is discussed. W. A. P. (C. A.)

Latent heat of vaporization. VL. A. KISTYAKOVSKII. *J. Russ. Phys. Chem. Soc.*, 53, I, 256-64(1921).—A new formula for the calcul. of the heat of vapn. of unassociated liquids was worked out by applying the 3rd principle of thermodynamics (cf. preceding abstr.). The formula is $JQ = RT \ln RT$, which states that for unassociated (or poorly associated) liquids, whose vapors at the b. p. have the normal mol. wt., the heat of vapn. = the vol. of the vapor multiplied by the natural log of the same vol. J is the mech. heat equiv. in joules, Q is in large calcs., the gas pressure is in atm. and the vol. in cc. Satisfactorily agreeing values for Q were calcd. by the use of this formula for 74 poorly associated liquids which includes all of those given in Landoldt-Börnstein, *Phys. Chem. Tabellen*, 1912, 834-42, in addn. to some others of previous Russian data. The new formula does not contain any empirical factors and it is offered by K. as the law of the latent heat of vapn. for unassociated liquids at their b. ps. and at 1 atm. pressure.

W. A. P. (C. A.)

The behavior of pumice stone during the dehydration of organic liquids. ARMIN SEIDLBERG. *J. Assoc. Official Agr. Chem.*, 7, 98-106(1923).—Pumice stone, or any substance consisting of small particles or having numerous fine capillary openings, has a greatly increased tendency to adsorb liquids and gases, particularly after being heated. The wt. of material in this condition is affected to a marked degree by changes in temp. and pressure. It gains wt. after being heated while in a desiccator, and also during the process of weighing. For this reason also it readily adsorbs moisture from the atm. or from liquids spread over it. This adsorbed moisture is held very tenaciously and can only be removed by heating the pumice to redness. It appears that the presence of this adsorbed moisture has a decisive effect in accelerating the decompn. of org. residues distributed over the pumice. When the pumice is heated to redness before being used and all the moisture thus expelled, an approx. const. wt. may at times be obtained due to the balancing effect of 2 opposing errors. This const. wt. may or may not be correct and checks can usually be secured only by prepg. all the pumice used under identical conditions. Where the pumice is dehydrated at the comparatively low temps. used for the evapn. of the liquid it is not possible to secure significant results that will indicate the true amt. of solid matter present. If too low a temp. is used not all the H_2O is expelled, particularly in the presence of viscous material. With higher temps. it is not possible to secure a distinct end-point that will clearly distinguish between the loss due to the decompn. of the solid and that due to the evapn. of the liquid portion, and it is not possible to attain a significant "const. wt." that indicates the correct result.

J. A. K. (C. A.)

PATENTS

Mica, asbestos, and like compositions. PLAUSON'S (Patent Co.), LTD. Brit. 193,520, Nov. 29, 1921. Residues of mica, asbestos, talc, and similar silicates are partly or wholly converted into the colloidal state by high-speed mech. disintegration, preferably in a colloid mill as described in 155,836 (C. A., 15, 1788); the colloidal soln. is subjected to ultrafiltration, dried *in vacuo*, and molded under pressure. Dispersion-accelerators such as colloidal silicic acid, alkali silicates, colloidal ZnO , aluminates, sulfite-cellulose liquor, gum arabic, and tannin may be employed. Fillers or binding agents such as rubber, natural or artificial resins, drying oils, olein, and finely divided clay may be added to the silicate either before or after disintegration. (C. A.)

General

Burning wood for heating steam boilers. PIERRE PRÉVOST. *Rev. Mat. Constr. Trav. Pub.*, 168, 204-5(1923). L. N.

Asbestos industry, S. Africa. ANON. *Mining & Eng. Jour.*, 34, 465(1923).—

S. Rhodesia has recently become an impt. producer of asbestos, averaging some 12,000 T. annually; further important deposits are being developed in the Transvaal and Natal; also Mozambique. Only 2 or 3 plants in S. Africa make finished products. The raw mat. is first crushed and fiberized, and all foreign elements eliminated without destroying its fibrous qualities. It is then beaten to a pulp and mixed for about 15 min. with Port. cement. If red tiles are to be made, a small quantity of powdered red iron oxide is added. The mixt. is carried by flumes to a mach. which turns out the pulp in large slabs. These are placed in an edge trimming mach. for squaring or cutting into tiles, and thence to an hydraulic press, where the slabs are pressed between steel plates. The finished slabs or tiles are then "cured" by being kept in a drying shed for about 2 months, after which they are ready for a variety of industrial uses. The mach. which converts the pulp into slabs is most interesting in its opern.; one of the rollers picks up the asbestos-cement pulp and spreads it layer upon layer on an endless traveling belt. From this it passes to a steel collecting drum; when the pulp is of sufficient thickness a bell rings and the operatives strip it off in the large slabs. Sheets may thus be turned out in varying thicknesses—say from one-eighth to one inch—by increasing or reducing the number of layers of pulp. Millboards made entirely of asbestos fibre are also made, and for this and the asbestos-cement products there is a great variety of uses, apart from bldg. purposes, such as door panels, chair seats, cattle and poultry troughs, road signs, filing cabinets, table-tops, basin and dishes, school blackboards. O. P. R. O

A visit to the potteries of Norway, Sweden and Denmark. DOGAR SINGH. *Trans. Ceram Soc. (Eng.)*, 22[1], 29(1922-23).—"The Porsgrund Pottery Factory" was established in 1885, by the Norwegian Govt. The body mixt. consists mainly of feldspar, quartz, and china clay. The machinery which is used for pugging the body mats. for mfg. hollow ware and flat ware is very economical and scientific. One man and one boy can make 1500 plates in a day. The stove room is also of quite a new type. Each room has 20 compartments and each compartment is divided into 10 shelves, erected on a 4-wheel wagon. When the goods are dried the whole compartment is pulled out and brought to the lift by which it is carried down to the first floor, whence it is taken to the bisque oven. All stoves for drying purposes are on the top floors and utilize the surplus heat given out by the kilns while cooling. Another process, a German patent, is for engraving steel instead of copper plates, for printing purposes. The Rorstrand factory at Stockholm specializes in mfg. porcelain for elec. purposes. These insulating fixtures are made of a mixt. of white-burning clays, feldspars and flint. Articles like wiring fixtures, knobs, cleats, receptacles, attaching plugs, and switchboards are made by the "dust press" method. The presses are very simple, each making from 1500 to 3000 pieces in a day, according to the size of the piece. All these pieces are finished by one firing. Each piece is sent to the testing shop where it is elec. tested. Most of them are tested by a very high tension current of from 2000 to 4000 kw. In Höganäs, there is one of the largest concerns for refractory goods in Sweden. This factory also manufactures all sorts of acid jars and sanitary ware. The mats. from which the silica bricks and slabs are made are quartz, sand, fireclay and quartzite. The Bing and Grøndahl Porcelain Works are located in Copenhagen. They have charming pieces of statues and cryst. glazes; almost all the figure work has been copied from the Royal Museum from the models of Thorwäldsen's works, the famous Danish sculptor. Here they are making expts. for firing their goods with liquid fuel. They make hotel and ship ware, which are generally sold to Spain, France, England, and South America. The Royal Copenhagen Factory has a special reputation in the pottery world for its under-glaze colors. A few years ago, the factory purchased a new plant for crushing and grinding the raw mats.; this is worked by only two men. This factory has its own special color-mfg. branch, which is run by a skilled and trained man. By the use of pure Norwegian

and Swedish feldspar and quartz, and the finest English china clay, the most charming and attractive goods are manufd., and on them life-like paintings of birds, fishes, animals and water or landscapes, or figure subjects are painted in elegant and admirable underglaze or enamel colors, such as cobalt blue, peacock blue, pink, crimson, greys and greens. Special attention has been given by the Danish factories to the manuf. of saggars. Two pug mills are erected for thoroughly pulverizing and mixing the clay and the grog together. One pug mill is vertical and one is horizontal.

H. F. S.

The Danish ceramic industry. CARL JACOBSEN. *Trans. Ceram. Soc.* (Eng.), 22 [1], 20(1922-23).—Boring operations, carried even to the greatest depths at various places all over the country, have yielded evidence of comparatively recent sedimentations only. China clay, high-grade refrac., white burning plastic clay and coal are nowhere to be found in Denmark. Clay suitable for bricks not of very good quality is found in large quantities all over the country. The 200 brick plants of the country produce, in normal times, from 400 to 500 millions annually. In addition to bricks, the brick plants also produce roofing tiles and drain pipes. Bornholm possesses a fairly large deposit of pure china clay. It was formerly used for making china. It is too ferruginous to produce an absolutely white porcelain. Nowadays, it is used for earthenware, in the manuf. of paper, and finally for mixing with fireclay to make refrac., clinkers and saggars. Fireclay of a good, though not of the very best, quality is found in many localities in Bornholm. The Danish common pottery indus. is represented by about forty small works, which turn out both glazed and unglazed ware. Of far greater interest is the artistic ware, with a porous body, which by close coöperation with native artists of distinction, has now attained a high standard. Modern Danish earthenware is produced at the "Alumina" Works, which are associated closely with the Royal Porcelain Works. The concern is now known as the "Copenhagen Fayence Factory." The biscuit ware is fired in a newly erected, continuous, gas-fired Mendheim kiln. A highly important indus. development was initiated by Bing and Grøndahl in the manuf. of tech. porcelain, particularly for elec. purposes. Another concern, the Dansk Porcellanisfabrik, of Kast-rup, in Amager, also manuf. electro-technical porcelain.

H. F. S.

Kaolin. ANON. *Mining Operations*, 81-2(1922).—Considerable development work was effected, 1922, of the kaolin deposits of Amherst township, P. Q.; length of prospecting drifts and cross-cuts totaling 1250 ft.; a large quantity of kaolin, contg. an average of about 50% of white quartz sand has been blocked out. The very ingenious method of mining adopted to bring the crude clay into soln. underground, and to pump this thin pulp from a pump situated in the main drift, to the surface, is really underground hydraulics. The pump installed is a 3-in. two-stage Morris centrifugal sand pump, directly connected to a 60 h. p. elec. motor; the capacity of the pump, at 1200 r. p. m. would be 300 gal. a minute, containing 10% of solid matter. The thin pulp from the pump goes into a settling cone, 8 ft. in diam. in which the coarse sand drops to the bottom and the clay and fine sand in suspension overflows with the water into two sets of troughs each 1000 ft. long, along which the fine sand falls and settles on the bottom, and the jet of water holding the clay goes to eight large settling tanks, the largest of which measures 75 x 72 x 7 ft. After drawing off the top liquid, the settled pulp which now holds 30% china clay, is pumped to the filter-presses under a pressure of 100 lbs. per sq. in. The filter-cakes, which contain about 25% moisture, are placed on racks, and wheeled on cars, into a drying chamber through which circulates a current of hot air. When completely dry, the cakes are broken up and put in the bin, ready for the market.

O. P. R. O.

In burning carbon which is formed first, carbon monoxide or carbon dioxide? CARL KULLBERG. *Teknisk Tids.*, 53 (Kemi), 41-6(1923).—Coke was heated in a current of air under proper exptl. control and the CO and CO₂ were detd. Both CO and CO₂

were formed directly from the C and neither one can be considered as primary with respect to the other. The relative amts. depend upon the temp. With an increase in the temp there was a relative increase in the CO_2 . For 360° the figures reported indicate that there was 1 part CO to 4 parts CO_2 . The burning of the CO to CO_2 is a relatively slow reaction and in the course of the expt. (360° series) only about 10% of the CO formed was oxidized. This work is in reply to the theories of Aufhäuser at present debated in the German journals. (Cf. book reference under A. in *C. A.*, 16, 1311.)

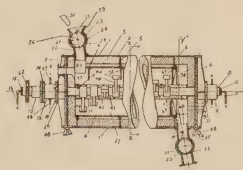
A. R. R. (*C. A.*)

Research, an industrial investment. H. E. HOWE. *J. Am. Leather Chem. Assoc.*, 18, 465-75(1923).—A plea for research in fundamentals. Instances are cited of the great rewards attending persistent research.

J. A. W. (*C. A.*)

PATENTS

Retort for the distillation of shale, bituminous coal, and other materials. CLAUDE M. GARLAND. U. S. 1,473,616, Nov. 13. In a device of the character described, a substantially horizontally arranged cylindrical retort, a charging device located near one end of the said retort, a discharging device located near the opposite end of the said retort, a false head near the discharge end of the said retort, an aperture for the discharge of material located in the said false head and a gate for varying the opening of the said aperture:



Pottery, bricks, etc. M. BACCHIOLELLI and A. MEIFREE-DEVALS. Brit. 196,342, Jan. 14, 1922. Igneous rocks such as lava, basalt, dolerite, greenstone, etc., for use in pottery and making brick and tile, are crushed to powder and agglomerated under the influence of heat (with or without the addn. of impoverishing substances such as chamotte, quartzite, sand, etc., or fluxes) at a temp. lower than their own m. ps. The rock may be crushed to powder and porphyzied and if desired mixed with impoverishing materials and H_2O added to form a paste. It is then shaped by any known process either in the mold with or without pressure or in the lathe or by pouring in the state of slip in an absorbing mold. After being finally fashioned, it is dried and fired at the required temp. Other processes are stated.

(*C. A.*)

CERAMIC ABSTRACTS

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Art

Ceramic mosaic: standardized sheets and patterns. ASSOCIATED TILE MFGRS. (Beaver Falls, Pa.) *Arch. Forum*, 29 [5], 248-9(1923).—This mfg. catalog includes borders, all-over patterns, and diapers of various sorts, illusd. in color with sizes of the sheet units which are to be had. It represents the first fruits of standardization work carried out among ceram. mosaic mfgs. through the assoc. F. T. H.

Cement, Lime and Plaster

The actual uses of alumina cements. EDWIN C. ECKEL. *Concrete*, 23, 175-6 (1923).—Alumina cement of Amer. mfg. will be on the market in important tonnages from next spring onward. It has been manufd. and used in Europe in commercial quantity for several yrs. The alumina cements have been used in 2 different fields, each employing primarily one of its 2 exceptional qualities: (1) its resist. to chem. attack; (2) the great rapidity with which it attains max. strength. This article deals with resist. to chem. attack only, a later one to treat on quick-setting properties. A French railroad found difficulty with Port. cement in masonry work in tunnel construction in regions of alkali-water. BIED worked out these low-index alumina cements to fit this particular trouble some 15 years ago, and solved the problem. (See following abstract. Also *Ceram. Abs.*, 2 [5], 91(1923).) Three cases are cited where concrete of alumina cement resists the action of sea water better than that from Port. cement. A number of plants engaged in various branches of the chem. indus. have tried and are still trying alumina cement for tank linings, drip boards, etc. In some of these uses it has succeeded and will have a utility, in others it has failed just as badly as all of its predecessors, Port. cement included. F. T. H.

New cements and old, and what we may do with them. EDITOR. *Concrete*, 23, 173-4(1923).—An article on quick-hardening cement (alumina cement) is quoted from *Concrete and Constructional Engr.* (London) in which it is concluded that it is "not without value to the user of Port. cement that the appearance of a rival cement in the market may stimulate research and possibly lead to the production of Port. cement with quick-hardening qualities." F. T. H.

High-alumina cement. J. BIED. *Revue Universelle des Mines*, July 15, 115 (1922).—Aluminous cement is essentially a cement in which the alumina content is greater or at least equal to the silica content. Ordinary Port. cement has been found to be attacked and decomposed by sea water and in tunnels and other masonry exposed to ground waters contg. calcium sulphate or magnesium sulphate, it has been found to de-

teriorate and decompose. This deterioration has been explained by the formation of the sulpho-aluminate of lime which crystallizes with 32 moles of water and the enormous increase in volume breaks down the structure. Pozzolini cement cannot be successfully used where it is warm or damp. In his researches, Vicat discovered that any cement

with an index or ratio $\frac{\text{silica} + \text{alumina}}{\text{lime} + \text{magnesia}}$ greater than 1 would not be decomposed by sea

water. The aluminous cements have an index exceeding 1. Tests of CaO , Al_2O_3 and 3CaO , $5\text{Al}_2\text{O}_3$, the principal aluminates present in this cement, made by P. A. BATES (Bur. Stand., Washington) show that the addn. of gypsum reduces the strength. The time of setting varied, the initial set being from 25 min. to 5 hr. and the final set from 50 min. to 7 hr. A test piece made of neat cement attained a strength of 25 kg. in 24 hr. and 56 kg. in 28 days. The mortar attained an equal strength of 24 kg. in 24 hr. but only 50 kg. in 28 days. In compression the mortar reached a strength of 250 kg. in 25 hr. and 400 kg. in 7 days, and 500 kg. in 28 days. These mono- and semi-calcium aluminates give an almost instantaneous set if mixed with as little as 1% of lime or 3% Port. cement. Bates confirmed the general fact that this cement is stronger in a mortar than pure, and stronger in a concrete than in a mortar. The set of aluminous cement commences in about 4 hr. and is complete in about 7 to 8 hr. The hardening is very rapid and in 72 hr. one can guarantee a concrete as strong as can be made using Port. cement in 90 days. Added to this is a resist. to decompn. Contrary to other cements, aluminous cement starts hardening on the interior and progresses to the outside. It has a coeff. of elasticity, almost twice that of ordinary cement. A typical analysis is as follows: Silica, 10 to 12%; Alumina, 40 to 45%; Lime, 35 to 40%; Iron oxide, 15 to 20%. The index of this is better than 1.25. Ordinary Port. cement has a silica content of 20 to 22%, alumina, 6 to 8%, and lime, 64 to 65%. Aluminous cement is produced by fusion either in an elec. or water-jacketed blast fur., or by clinkering in a rotary fur. A mixture of bauxite and limestone is used. In the blast fur., the iron oxide of the bauxite is completely reduced to steel which has a m. p. above that of the cement, and in order to tap it from the fur. a large excess of coke and a hot blast is necessary. This has lead to the introduction of heat interchangers. In the manuf. with the elec. fur. the chief difficulty is the low condy. of the alumina and limestone requiring the use of the arc fur. resulting in excessive current and electrode consumption. The rotary kiln is not so readily adaptable to the manuf. of this cement because the aluminates desired do not form readily below the fusion temp. which is much higher than that required for clinkering Port. cement. The rotary kiln would be best if refractories could be found to withstand the molten cement. There is a possibility of burning the cement mixt. in kilns such as are used for refrac. bricks. The mixt. would be made into bricks and held at a temp. just below the fusing point until vitrification took place. See preceding abstract.

F. T. H.

Good mortar, mortar joints and mortar colors. ANON. *Concrete*, 23, 97(1923).—The essentials of good mortar are: (1) It should be dense and non-absorbent. (2) It must have a sufficient compressive strength to withstand pressure in the wall without crushing. (3) It must attain strength rapidly. (4) It must be reasonable in cost and easily obtainable. (5) It must possess good working qualities. (6) It should look well. (7) It should endure permanently. Mixts. and methods for attaining these results are briefly described.

F. T. H.

The Spanish cement tile industry. FRANK ANDERSON HENRY. *Concrete*, 23, 98(1923).—Annual production of factories in Spain exceeds 300,000 sq. m. of concrete tile. Cement tiles are used for floors in place of wood. Ordinary natural colored tile are used for warehouse and factory floors and colored mosaic tiles for residence floors. The process of mfg. is described.

F. T. H.

Material dealer furnishes concrete ready mixed. ANON. *Concrete*, **23**, 99(1923).—A brief description of a central mixing plant. Concrete must be used within 45 min. from time it is mixed. F. T. H.

How to make concrete roof tile. CRAWFORDSVILLE FOUNDRY CO. *Concrete*, **23**, 120-1(1923).—Specifications for mats., proportioning, machine operations and curing are described and details of equipment illusd. F. T. H.

Pittsburg, Calif. road tests. ANON. *Concrete*, **23**, 126-7(1923).—Tabulated results of tests of 13 diff. sections of concrete road giving a total computed cost including maintenance plus original cost. F. T. H.

Cost of reinforced concrete for lighter use in buildings. ANON. *Concrete*, **23**, 133-5(1923).—A discussion of the economies of reinforced concrete skeleton construction as compared with masonry bearing wall construction. F. T. H.

Regulating setting time of Portland cement. ANON. *Can. Eng.*, **45** [20], 485-7(1923); also **45** [21], 509-11(1923).—These articles form an abstract of Pamphlet No. 5, Brit. Port. Cement Research Assn. Experiments showed that higher temps. in the mass cause quicker setting. The setting process is more or less suspended around the f. p. of water. Increased propns. of gaging water in the mix cause somewhat slower setting. Pure, dry air has no effect upon cement samples but after about 20 weeks of exposure to the moist air of England, cement becomes practically inert, giving a loss on ignition about the same (14-15%) as set cement. Higher alumina contents and finer grinding both speed up the time of set. Various sol. salts have different effects; sea water for gaging slows up the setting somewhat. Exposure to moist CO₂ causes remarkable increases in setting speed, and also changes the character of the hardened mass. Water of crystn. is absorbed from salts by dry cement in contact with them, causing a retardation of set. Of many salts added, alkali carbonates had a marked accelerating effect on setting. Gypsum is uncertain and irregular in its effects as a retarder of setting. B. M. I.

Tests of caustic magnesia made from magnesite from several sources. P. H. BATES, ROY N. YOUNG AND PAUL RAPP. *Bur. Stand., Tech. Paper* **239** (Abstract).—The properties of oxychloride cement have been studied, particularly in reln. to the source (or properties) of the magnesite ores, conditions during the calcining process, and various oxychloride cement mixts. Ore from Greece, from 2 diff. sources in Calif., and from the State of Wash. were used, as these were representative of the chief sources of supply for this country. They include 2 diff. types of ore, the first 3 being amorphous, and the last cryst. Each ore was crushed and sepd. into 3 lots, differing only in size of particles. Size 1 contd. the particles which passed a 1-in. screen, but was retained on a 1/2-in. screen; size 2 passed a 1/2-in. but was retained on a No. 4 sieve; and size 3 passed a No. 4, but was retained on a No. 8 sieve. Each lot was then calcined in a 3 by 30 ft. rotary kiln under fixed conditions throughout the opern. The temp. range, including all burns, was from 700 to 1100°C. After grinding the caustic magnesia (the product from the kiln), the fineness, sp. gr., wt. per cu. ft. (loose and packed), loss on ignition, carbon dioxide content, and index of refraction were detd. There was difficulty in detg. the fineness, particularly in the use of the No. 200-sieve, on account of the finest particles of the very active magnesias adhering to the screen or agglomerating into larger particles during the opern. There were wide differences between loose and packed weights per cu. ft., which brings out the importance of weighing caustic magnesia, when making up mixts., rather than measg. by vol. as some do. Although a min. and max. carbon dioxide content has often been used in specifs. for caustic magnesia, no reln. was found between this constituent and the behavior of the oxychloride product. The index of refraction gives promise of being valuable in detg. degree and uniformity of burning, but will not indicate changes in the mat., occurring during storage, that have a marked

effect on the properties of the cement. It was necessary to "age" some of the very active magnesias to make them usable. Caustic magnesia from each lot was used in mixes prepd. according to 3 flooring, 2 stucco, and one lab. test formula. Only one concn. (22 Bé.) magnesium chloride soln. was used for mixing with the dry mat., as this concn. is conceded to be the best for general use. Service tests were made in conjunction with the lab. tests. The consistency of the wet mixt. (excepting the lab. test mix) was such as is generally used in practice, and was kept the same in all cases, as nearly as possible. The service tests consisted of the laying of flooring panels; erection of stucco panels, all exposed to actual service conditions; and subsequent observations, including meas. of linear changes. Three types of specimens were used in making strength tests. The briquette (of the shape used in the standard strength test for Port. cement mortar), for tensile strength; a $1\frac{1}{2}$ by 2 by 13-in. bar for transverse strength; and a 2 by 4-in. cylinder, for compressive strength. In order to get an indication of the effect of intermittent wetting and drying of the set stucco during its early life, such as the material generally receives from exposure to the weather, specimens were tested in the following manner. After storing 21 days in the laboratory air, they were placed in water for one day, followed by one day in air under certain temp. and humidity conditions. This cycle of water and air storage was repeated twice, and after an additional day in air (making 28 days in all), the strength tests were made. Also, linear changes, resulting from this treatment, were detd. The lab. specimens for expansion tests were $1\frac{1}{2}$ by 2 by 13-in. bars. The meas. were made by means of a 10-in. Berry gage. The results show that the various ores used require different conditions of calcination in order to produce caustic magnesias of approx. the same quality. Very light burning produces a magnesia which is too active for use in the customary oxy-chloride cement mixts. without "aging" or the use of a retarder. An increase in the degree of calcination increases the time of set of the magnesia. Also, the deg. of calcination affects, to a great extent, the strength, water resistance, and vol. change of the set cement mixt. However, there are other factors which influence these properties nearly as much if not more (within reasonable limits) than the burning. By the use of different types of aggregates with a magnesia, products very different in behavior under test, may be obtained. Also, by changing the proportion of given aggregates, the products may be made to differ widely. Therefore, a magnesia considered good in quality may be made to give very unsatisfactory results, and one considered very poor often may be made to give excellent results. (The complete paper may be purchased from the Supt. of Documents, Government Printing Office, Washington, D. C., price 10c.)

H. F. S.

Proper handling of lump lime. ANON. *Contract Rec. and Eng. Rev.*, **37**, 1071, (1923).—When using a quick-slaking lime, if insufficient water is added, the paste is not as plastic and works short. It feels slightly gritty, and has a yellowish tinge. The temp. of the mass is raised considerably above boiling point, and a new chem. reaction takes place. This results in a formation of a subs. which absorbs carbon dioxide at a rapid rate, and thus hardens before it may be used. Exactly what this new compound is, has not been definitely detd., but the result is well known by those who use lime. In the case of "drowned" lime, the excess of water has absorbed too rapidly the ht. for slaking, and the change from quicklime to paste is retarded. When the paste is formed it is thin and watery and unsatisfactory. A good lime putty, properly prepd. and allowed to age or soak for some time previous to its use, makes a mortar or plaster that is easily applied; aging the paste imparts to it a degree of smoothness not otherwise obtained.

O. P. R. O.

Effect of organic decomposition products from high vegetable content soils upon concrete drain tile. G. R. B. ELLIOTT. *J. Agr. Research*, **24**, 471-500 (1923).—Concrete

tile as at present made breaks down in all peat soils or when exposed to the action of peat waters. The more porous the tile the more rapidly it disintegrates, and an acid soil aids in the disintegration. A high percentage of lime in the soil delays but does not stop the decompn. of the tile. Methods are described for increasing the permanency of concrete tile in peat soils.

W. H. R. (C. A.)

BOOK

Nineteen Stories of Lime. TRADE PUBLICATIONS. The title of a new book issued by the Central Division of the National Lime Association illustrating the various uses of hydrated lime in concrete construction. The various advantages which are attributed to the use of hydrated lime in concrete are: watertightness, workability and resilience.

F. T. H.

Enamels

PATENT

Method of marking enameled ware. EMIL S. DENK. U. S. 1,473,903, Nov. 13.



The method of marking enamel ware, comprising coating the enameled surface over the area to receive the mark with tacky material, applying to the coating an enamel, again coating the coated surface partially or wholly with a tacky material, applying to the part so recoated an enamel, and treating the ware to render the composite mark permanent.

Glass

On the refractive index changes in optical glass occasioned by chilling and tempering. F. TWYMAN AND F. SIMEON. *Jour. Soc. Glass Tech.*, 7 [27], 199(1923).—The changes in refractive index due to the tempering and chilling of a dense barium crown glass and a borosilicate crown were detd. The data is given and the results are plotted. *Conclusions:* (1) It has been established that the effect of chilling the dense barium crown glass and borosilicate crown samples referred to may be the lowering of the refractive index by as much as 0.004 in the case of the former, and 0.0013 in the case of the latter. (2) This lowering of refractive index is removable by htg. to a temp. for a length of time which have been ascertained for certain cases; (3) If the dense barium crown glass be cooled from the annealing temp. slowly under pressure, and measured not under pressure, the resulting refractive index is higher than when it is similarly cooled free from pressure, by amts. of the order of 0.00035; (4) The effect under (3) above seems to us to require further investigation for its complete elucidation, but for practical purposes the main effect of the chilling alone appears of importance; (5) It is clear that a want of homogeneity could be produced by molding, owing to surface chilling, which requires for its removal a longer maintenance at the high temp. than will suffice to remove elastic stress from the homogeneous sample.

J. G. P.

A note on the suitability of quartzose residues for glass manufacture. D. J. REES. *Jour. Soc. Glass Tech.*, 7 [26], 130(1923).—The residues from the crushing plants in the Kolar Goldfield, Mysore, India, were examd. for the purpose of detg. their suitability for making glassware. This investigation indicated that residues such as those from the Kolar Goldfield would be a satisfactory raw mat. for use in the manuf. of common glassware when freedom from color is unessential.

J. G. P.

The year in review in the world of glass technology. W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 7 [26], 132(1923).

J. G. P.

The physical properties of boric oxide containing glasses and their bearing on the general problem of the constitution of glass. S. ENGLISH AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 7 [26], 155(1923); see *Ceram. Abs.*, 2 [12], 275(1923).—Measurements were made of the thermal expansion, the refractive index and dispersion of two series

of sodium borosilicates, the first series contg. approx. 20% of sodium oxide, the second 10%. In each case the silica present was progressively substituted by boric oxide until in the 20% Na_2O series as much as 43.7% B_2O_3 was present, and in the 2nd series 46.07%. Results show that the linear relationships between chem. compn. and phys. properties, which had been found to subsist over a considerable range for many types of glasses, do not hold in the case of the sodium borosilicate glasses. Minima occur in the thermal expansion curves, and max. in the case of the density and refractive index, as also in the case of the annealing temp. The detd. results on thermal expansion show that Winkelmann and Schott's thermal expansion factors clearly do not hold for the boric oxide glasses, except over a very limited range. On practical grounds, the value of boric oxide for the prepn. of glasses of low thermal expansion is shown to be limited, since beyond a certain amt. the expansion increases instead of decreases. Various theories are discussed to explain the special results obtained in the case of the boric oxide glasses.

J. G. P.

Stainless steels from the point of view of the glass industry. W. H. HATFIELD. *Jour. Soc. Glass Tech.*, 7 [26], 142(1923).—The properties of the various types of stainless steels were examd. The strength of stainless steel, as detd. on the tensile testing mach., varies according to the compn. and to the deg. to which the temp. is drawn, from above 100 T. per sq. in. breaking load in the hard condition, down to 30 to 40 T. per sq. in. when fully tempered. A specimen series of figures, obtained with a steel contg. 0.30% of carbon, is given. The mechanical properties of stainless steel in the hardened and slightly tempered condition were detd., and lab. tests in full details are given. Fatigue tests were also carried out on stainless steel in the hardened and slightly tempered condition, and results are given. Tests on stainless steel at high temps. show that it maintains its strength to a much greater degree than ordinary structural steel and may, therefore, be employed with advantage where parts have to withstand stress at temps. above normal. Tests on hardness as affected by increasing temps. were made and the results indicate that the energy absorbed is not substantially modified until temps. approaching 600° are attained. Tests performed up to 1000° on mild steel, alloy steels, tungsten steels, and stainless steels showed that the stainless steel scaled less than any of the others. The microstructure of stainless steel is described and its general phys. properties are given.

J. G. P.

A rapid method of testing the durability of glassware. H. S. BLACKMORE, VIOLET DIMBLEBY AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 7 [26], 22(1923).—An investigation is conducted on the suitability of a soln. of narcotine hydrochloride for testing the durability of glassware. A description of the test is given. *Conclusion:* The narcotine hydrochloride test applied under the conditions outlined in the paper is quite a satisfactory method of testing rapidly the durability of glass towards water.

J. G. P.

A study of the melting and working properties of boric oxide glasses, with special reference to the borosilicates. VIOLET DIMBLEBY, F. W. HODKIN, M. PARKIN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 7 [26], 80(1923).—A discussion. J. G. P.

Tank furnace works organization. T. C. MOORSHEAD. *Jour. Soc. Glass Tech.*, 7 [26], 105(1923).

J. G. P.

Organizing for production from pot furnaces. W. W. WARREN. *Jour. Soc. Glass Tech.*, 7 [26], 83(1923).

J. G. P.

Investigation of pot-attack. W. ROSENHAIN. *Natl. Phys. Lab.* (Rept. for 1920, 124 pp.).—Further study of pot-attack shows that convection currents caused by temp. differences between top and bottom of pot are a factor which may disguise the convection currents set up by changes in density. It is suggested that maintaining the top of the pot at a higher temp. than the bottom will minimize the attack. E. S.

Determination of the viscosity of glass. W. ROSENHAIN. *Natl. Phys. Lab.* (Rept. for 1921, 186 pp.).—The viscosity of glass at temps. from 400°C to 700°C has been detd. by measg. the rate of twist under a known torque of rods of the glass in question.
E. S.

Some phenomena of pot-attack. W. ROSENHAIN. (Collected Researches.) *Natl. Phys. Lab.*, **15**, 112–32(1920); *Trans. Soc. Glass Tech.*, **3** (1919).—The depth of attack by molten glass on the walls of a pot or on a clay rod inserted in the glass, increases in linear reln. with the distance below the surface of the glass. This is shown to be due to circulating currents set up by the decrease in density of the glass caused by soln. of the clay at the surface of contact resulting in unsatd. glass striking the bottom of the pots. The same phenomenon, occurring locally in small pits results in the "drilling" of pots. In the case of soln. by water these phenomena are generally reversed because the solutions are denser than the solvent, but with org. solvents they can be duplicated exactly. In the case of glass it is possible to control the currents and shift the zone of "drilling" by the use of a protecting ring of inert material, *e. g.*, zirconia. The rate of attack increases with the temp. The use of the X-ray is advocated for the detection of iron specks, air cavities, etc.
E. S.

The casting of pots for experimental work on optical glass. ALICE B. TAYLOR. (Collected Researches.) *Natl. Phys. Lab.*, **16**, 289–98(1921); *Trans. Soc. Glass Tech.*, **4** (1920).—In casting pots, if the slip is too thin, the grog separates, while, if it is too thick, bubbles are trapped. These difficulties are overcome by rapidly filling the mold with slip under an air pressure of 20 lbs. per sq. in. Good results are obtained only in a narrow range of viscosity.
E. S.

Chemical resistance of glass for the laboratory. A. MAURI. *Giorn. Chim. ed Appl.*, **5** [10], 495(1923).—Jena, Murano and Pyrex glass were investigated by treating with H₂O for a week, boiling H₂O for 3 hr., in H₂O at 134°C for 3 hr., 2 *N* H₂SO₄, boiling 2 *N* HCl, 2 *N* NaCl, 2 *N* NH₄Cl, *N*/10 NaOH, *N*/10 Na₂CO₃, 2 *N* NH₄OH, *N*/1 Na₂S. The Na₂S affected the glass the most. Jena and Pyrex lost nearly same wt. while Murano was less affected in all cases. H₂O, H₂O boiling 3 hr., 2 *N* NH₄Cl, and 2 *N* NaCl had no effect on the samples.
S. S. C.

Measurements on the gases evolved from glasses of known chemical composition. J. E. HARRIS and E. E. SCHUMACHER. *Bell System Tech. Jour.*, **2**, 122–32(1923).—Six kinds of glass were used, representing soda-lime, soda-potash-lead (lamp glass), and borosilicates of lead and soda. The specimen was placed in a container made of the same glass, and heated as close to the softening range as it was possible to go without causing the container to collapse. The gases driven off were examd. and classified as follows: (a) gases condensable above –78°C, (b) condensable between –78°C and 190°C (c), not condensable at 190°C, these fractions representing (a) water vapor, (b) carbon dioxide, (c) permanent gases: oxygen, nitrogen, hydrogen. The H₂O vapor was removed by surrounding the condensation trap with a mixt. of frozen and liquid acetone, and the CO₂ with liquid air. A McLeod gage was used to meas. the pressure of the evolved gases, and from the pressure the vol. was computed. It was found that at 200°C, the evolution of gas reached a max. for most specimens, thus proving that the adsorbed gas is driven off at that point. For the borosilicates, this point was 300°. Near the softening point (400°C for most specimens, 600° for Pyrex), the evolution of gas increased, this representing absorbed as well as adsorbed gas. The data shows a parallelism between per cent Na₂O + K₂O and vol. of adsorbed CO₂, which would indicate that adsorbed CO₂ is held by primary valence forces. It would seem that CO₂ is taken up by a film of NaOH formed by slow hydrolysis of the glass. In general, glasses running high in alkali give off more water vapor as well as CO₂ than do those of lower alkali content. By subjecting glass to a heat treatment of between 1500° and

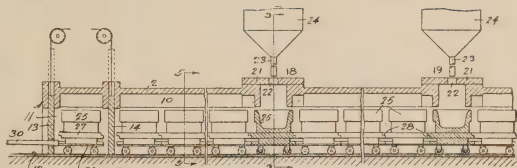
1600°C for one hour, the absorbed gases were practically eliminated, as shown by the small amt. of permanent gases obtained on the test, whereas H_2O and CO_2 remained as adsorbed gases. The conclusion is drawn that glass relatively free from absorbed gas can be produced by htg. the glass during the melting process to a sufficiently high temp. The greater viscosity of the borosilicates makes it more difficult to render them gas-free. A. F. G.

Silica glass or fused quartz. ELIHU THOMSON. *Gen. Elec. Rev.*, 26, 68-74(1923).—Historical account of manuf. of fused silica, with special ref. to author's patented elec. fur. process. Of particular interest are the illust. which include photographs of telescope reflector disks of clear quartz 1 ft. in diam., and large strain insulators of opaque quartz 10" in diam. Stress is laid on the peculiar advantages offered by fused silica, due to its extremely low expansion: It is possible to figure an optical surface of quartz without affecting the curvature by the heat of polishing; a reflecting telescope with quartz mirror would show no distortion under irregular htg., which is a serious defect of glass reflectors; quartz can be shaped by grinding whereas glass would be cracked by the ht. developed. Due to its high m. p., metals can be cast into recesses or holes in the quartz, without shattering the latter. A. F. G.

The manufacture of glass marbles. C. J. STAHL. *Glashütte*, 53, 356-7, 371-2, 403-4, 419-21, 435-6(1923). J. B. P. (C. A.)

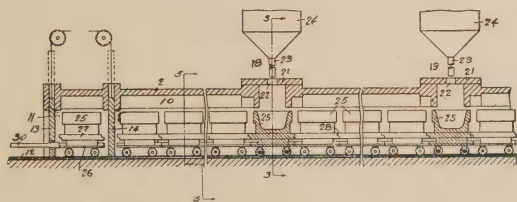
PATENTS

Method of melting glass in pots. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,476,431, Dec. 4. The method of melting glass in pots consisting in introducing the pots into a htg. chamber, moving the pots through said chamber, maintaining the temp. in said chamber as the pots move through same whereby the glass is melted and fined, and admitting batch to said pots at intervals in their passage through said heating chamber, the said pots being introduced into said htg. chamber and removed therefrom without exposing said chamber to the outer air.



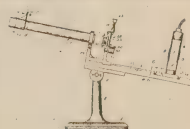
Glass-melting-pot furnace. FRANK E. TROUTMAN and CHARLES H. CHRISTIE.

U. S. 1,476,432, Dec. 4. A continuous pot-fur. for melting glass having a plurality of moving carriers therein, means for charging batch into said pots at intervals in said fur., means for varying the temp. at different portions of said fur., and means for introducing the pots into



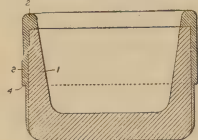
said fur. and removing the pots therefrom without opening the htg. chamber of said fur. to the outer air.

Lens-testing instrument. WALTER C. SCHLITZER. U. S. 1,475,515, Nov. 27. A lens testing instrument comprising means for supporting a test lens, a lamp housing located on one side of said lens supporting means and having an opening at one side thereof, a sleeve adjustable on the housing and positionable over said opening, the sleeve having a light emitting opening that is adjustable to proper relationship with the test lens and acts to project rays of light onto the test lens, a sight



tube on the opposite side of the lens supporting means, an image screen within the tube, and a condensing lens between the image screen and lens supporting means.

Glass-melting pot. FRANK OSBORNE. U. S. 1,475,650, Nov.



27. An open top plate glass melting pot provided with an annular shoulder and having a body portion of pot clay, and a rim and an outer shell for the body portion of a clay which is more refrac. than that of the body portion, such shell extending down from the rim to a point below the shoulder of the pot.

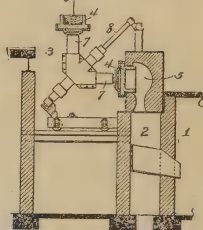
Art of drawing glass. HUGO J. WALTER. U. S. 1,475,527,

Nov. 27. The improvement in the art of drawing glass sheets which consists in presenting charges of molten glass successively to a drawing app., drawing a sheet from each charge of glass, and causing each sheet drawn to serve as a bait for the succeeding sheet whereby the successive sheets will be welded together.

Arsenate of lime product and process of making same.

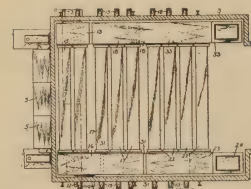
LOUIS CHARLES DREFAHL. U. S. 1,475,545, Nov. 27. Process of making a stable, water-insol. arsenate of lime product which comprises pptg. calcium arsenate in a medium maintained at a temp. of from 120°F to 160°F.

Lens and blank therefor and method of marking it for the purpose of identification. THEODORE B. DRESCHER. U. S. 1,475,473, Nov. 27. A transparent refracting lens of glass having a portion of the mat. of which it is composed slightly modified or altered in the form of a designating mark less in area than the surfaces thereof, said marking or tinting extending through the lens from one surface to the other. The herein described method of marking glass lenses and blanks therefor for identification purposes consisting in slightly altering or modifying the glass of which they are composed from one surface to the other in definite designs by subjecting limited portions thereof corresponding to the design desired, to the rays projected from an electrically excited vacuum tube, the duration of the exposure being only sufficient to render the design perceptible but without appreciably affecting the light transmitting or refracting powers of the lens or blank.



Leer. GEORGE W. BATCHELL. U. S. 1,473,897, Nov. 13. In a leer, a plurality of

flues, a gas inlet for permitting gas to enter the flues, the flues interconnected to form a continuous passageway for the gas through the leer, a burner located at one end of the connected flues, air inlets located at the ends of the flues to draw the air into the flues in the direction that the flame from the burner is moving to maintain the flame and the combustion of the gas as it progresses through the flues. In a leer, a plurality of flues, a gas inlet for permitting gas to enter the flues, the flues divided into sets of parallel connected



flues, the sets of flues interconnected to form a continuous passageway for the gas through the leer, the number in each set increasing progressively towards the stack end of the leer.

Method and apparatus for forming glass. ROBERT M. CORL. U. S. 1,474,019, Nov. 13. The method of forming glass, which consists in flowing a continuous column from a source of molten glass, progressively cooling the column below the point where gravity will vary its cross-section, progressively melting the advance end of the cooled column in such a manner that the melted portion will flow over the cooled portion and

vary the cross-section of the column and allowing the glass to set in the cross-section resulting from such flowing. See *Ceram. Abs.*, 2 [11], 249 (1923).

Leer for annealing glassware. DAVID STENHOUSE.

U. S. 1,474,058, Nov. 13.

A leer for glassware, comprising a horizontally disposed main annealing chamber of substantial length, said chamber having

ascending and descending legs communicating with its opp. ends and being located at a relatively great elevation whereby is created a natural seal for confining ht. thereto,

the ascending leg having a charging opening therein adjacent to its lower end, and an approx. horizontal cooling chamber communicating with said descending leg, and an

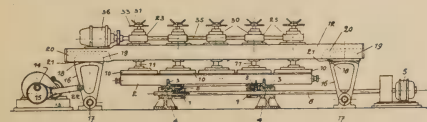
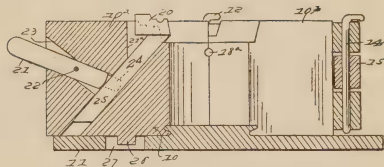
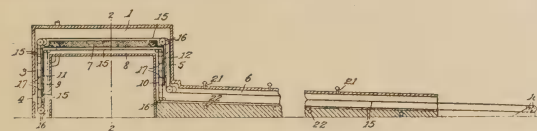
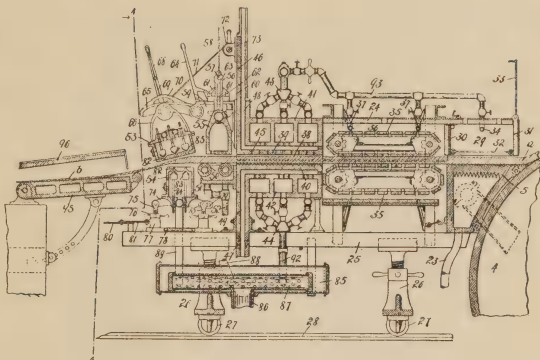
endless ware conveyor arranged for advance travel from the charging opening to and through said cooling chamber and for return travel throughout a path in which its temp. is raised to the required point by absorption of ht. given off by the ware and the leer walls.

Glass mold. JOHN G. MORITZ. U. S. 1,474,329, Nov. 13. A molding app. of the type indicated having a section or mold body and a ring or cap provided in their contact faces with complemental registering channels combining to form a handle mold in communication with the interior of the receptacle mold, and means for upwardly deflecting the molded handle after the completion of the molding operation and consisting of a lifter block movable with relation to and carried by one of the mold sections.

Apparatus for grinding, smoothing, and polishing glass, plate glass, and other material substances. CHARLES HEUZE. U. S. 1,474,672, Nov. 20. App. of the character described, comprising a table for supporting the work; a succession of rows of tools extending above and across the table, each row having an individual support; mechanism for imparting an endwise reciprocating bodily movement to all of said supports simultaneously, but moving the odd-numbered supports in one direction and the even-numbered supports in the opposite direction; and mechanism for rotating all

of the tools of a row simultaneously. Apparatus of the character described, comprising a table for supporting the work; a succession of rows of tools extending above and across the table, each row having an individual support; mechanism

for imparting an endwise reciprocating bodily movement to all of said supports simultaneously, but moving the odd-numbered supports in one direction and the even-



numbered supports in the opposite direction; and mechanism carried by and individual to each support for rotating all of the tools in the corresponding row simultaneously.

Heavy Clay Products

House insulation and fuel consumption. H. J. BURT. *Concrete*, **23**, 117-18(1923).—Insulating lumber is supplied in sheets and replaces lath. The unit B.t.u. ht. loss for 1 in. thickness is given: insulating lumber, 0.33; wood sheathing, 1.25; plaster, 1.50; brickwork, 4.00; concrete, 6.00. By the addn. of insulating lumber to ordinary forms of wall construction there is a ht. saving of from 30 to 40%, which the author claims should result in at least 25% fuel saving in residence construction. F. T. H.

Fire-resistive houses a reality. WHARTON CLAY. *Arch. Forum*, **39** [4], 33 (1923).—The Underwriters' Laboratories have announced that a wood-studded partition plastered on both sides by metal lath and plaster, and an ordinary wood-stud floor as commonly constructed, but protected on the under side with metal lath and plaster, will resist the intense ht. of their standard fire test for over one hr. and remain intact and carry its load beyond that period. They claim that ordinary lath and plaster will expose the wood behind, under the same conditions, in about 4 min. F. T. H.

Study effect of moisture on concrete slabs. ANON. *Cement & Eng. News.*, **35** [9], 30(1923).—Progress report of tests being conducted by U. S. Bureau of Public Roads, in conjunction with Eng. Exp. Sts. of Purdue Univ. Moisture, like heat, sets up internal stresses which probably tend to aid failure of concrete roads. Freezing of this moisture produces still greater stresses. 75 slabs are being tested in a specially constructed testing machine, in which alternate transverse failure occurs in less than two minutes. F. T. H.

Standard sizes for cement block and brick. ANON. *Concrete*, **23**, 162(1923).—Concrete brick to be the same as adopted for clay face brick: rough $2\frac{1}{4} \times 3\frac{3}{4} \times 8$ in.; smooth, $2\frac{1}{4} \times 3\frac{7}{8} \times 8$ in. Tentative standard sizes for concrete block and tile: Foundation concrete units: height $7\frac{5}{8}$ in., length $15\frac{5}{8}$ in. Wall thicknesses, 8 and 12 in. (thickness of units); load bearing wall concrete units, height $7\frac{5}{8}$ in., length $15\frac{5}{8}$ in. Wall thicknesses, 6, 8, 10 and 12 in.; load bearing wall concrete structural tile, height 5 in., length $11\frac{5}{8}$ in.; wall thicknesses, 4, 8 and 12 in.; concrete partition tile, height $7\frac{5}{8}$ in., length $15\frac{5}{8}$, 18 and 24 in.; wall thicknesses, 3, 4, 6 and 8 in. F. T. H.

Fire tests of brick walls. S. H. INGBERG. *Amer. Arch.*, **124**, 307-18 and 355-62 (1923).—*Scope of tests.* A rept. of a part of a program of tests to det. the effectiveness of brick walls as fire barriers and to obtain definite knowledge of their ht. insulation and stability under fire conditions. The series includes fire endurance tests and fire and water tests with 2 types of surface clay brick, 1 shale, 2 sand lime brick and 1 Port. cement brick. Auxiliary compressive, transverse and absorption tests were also made. (1) *Test specimens and construction details.* The test walls built on contract based on competitive bids to obtain representative workmanship were 11 ft. high and 16 ft. wide, being contd. in movable frames placed for test to form one side of the test fur. Some panels were restrained and some were unrestrained to represent varying conditions of use. Further tests of walls under load are to be made. (2) *Testing methods.* The fire exposure is obtained with oil burners and is regulated to conform to a predetd. time-temp. reln., 1700°F in 1 hr., 1850°F in 2 hrs., and 2150°F in 6 hrs. Temperatures in the fur., in the wall and on the unexposed side of the wall are measured by the thermo-elec. method. Six hrs. was the limit for the endurance test. In the fire and water test the wall was exposed to the fire for 1 hr. and then to a hose stream from a $1\frac{1}{8}$ in. nozzle under 50 lb. per sq. in. water press. was applied. (3) *Test charac. and results.* (a) *Deformation and cracking.* The first visible ht. effects were deflections toward the fire. Cracking along mortar joints and through brick were next noted. In

point of freedom from cracking the bricks in the series can be roughly placed in the following order: Eastern surface clay, Western surface clay, concrete, sand-lime and shale. (b) *Heat effects.* The first indication was issuing of steam from free water from open or imperfect mortar joints. The time required to reach on the unexposed side a temp. of 150°C (302°F), the danger point for hazardous occupancies varied from 1 hr. 25 min. with 4-in. walls to over 6 hr. with some 8-in. and all 12-in. walls; 250°C (482°F), the danger point for non-hazardous occupancies was reached in less than 6 hrs. by the hollow 8-in. walls and by the 4-in. walls. The final temp. at 6 hr. varied from 83°C with the 12-in. walls to 252°C with the 8-in. hollow walls. (4) *Conclusions.* From a study of the condition of the tested walls, the deflections and the temp. reached Ingberg gives the fire resistance periods of brick walls as follows:—

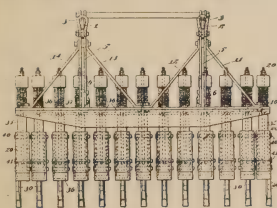
| Thickness | Type | Interior structural members framing into wall | Materials protected | Load on wall | Fire resistance period |
|----------------|-------------------------------------|---|----------------------------|------------------------|------------------------|
| 4-inch | Solid | Incombustible and fire resistive | Non-hazardous | Non-bearing | 1 hour |
| 8-inch | Solid | Incombustible | Non-hazardous | Bearing or non-bearing | 4 hours |
| 8-inch | Solid | Incombustible | Hazardous | Bearing or non-bearing | 2½ hours |
| 8-inch | Solid | Combustible | Hazardous or non-hazardous | Bearing or non-bearing | 1½ hours |
| 8-inch | Hollow | Incombustible and fire resistive | Non-hazardous | Bearing or non-bearing | 2½ hours |
| 8-inch | Hollow | Incombustible and fire resistive | Hazardous | Bearing or non-bearing | 1½ hours |
| 8-inch | Hollow | Combustible, on one side only | Hazardous or non-hazardous | Bearing or non-bearing | ¾ hour |
| 8-inch | Hollow, filled solid at floor lines | Combustible or incombustible | Hazardous or non-hazardous | Bearing or non-bearing | 1½ hours |
| 12- or 13-inch | Solid | Combustible or incombustible | Hazardous or non-hazardous | Bearing or non-bearing | 4 hours |
| 12- or 13-inch | Hollow | Incombustible and fire resistive | Hazardous or non-hazardous | Bearing or non-bearing | 4 hours |
| 12- or 13-inch | Hollow | Combustible | Hazardous or non-hazardous | Bearing or non-bearing | 2 hours |
| 12- or 13-inch | Hollow, filled solid at floor lines | Combustible or incombustible | Hazardous or non-hazardous | Bearing or non-bearing | 4 hours |

H. D. F.

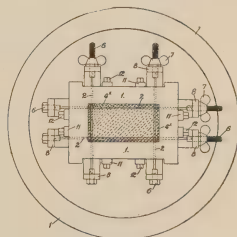
PATENTS

Manufacture of bricks. FREDERIC P. JONES. U. S. 1,475,832, Nov. 27. The manuf. or production of bricks or blocks of the kind referred to, characterized by sepg. an unbroken slice of the full surface dimensions from the formed body and then reuniting the severed slice to the body by a pressing means capable of simultaneously ornamenting the surface of the slice.

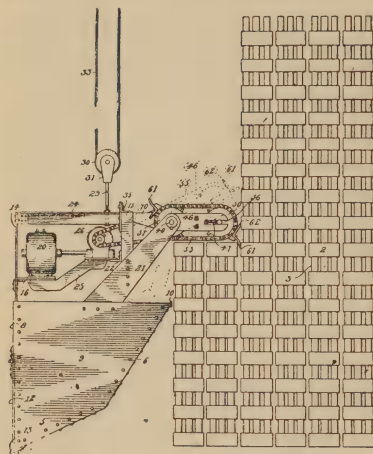
Brick-handling fork. WILLIAM W. WALLACE. U. S. 1,474,806, Nov. 20. Brick handling app. of the kind described, comprising an over-



head support, a plurality of horizontally extending brick engaging fingers and means connecting said fingers and said support consisting in a vertical bearing rigidly attached to said frame, a carriage adapted for vertical sliding movement on the bearing member and carrying the horizontal fingers, anti-friction



members between said carriage and said bearing and positive stop means coöperating with said anti-friction members to limit the vertical movement of said carriage.



Apparatus for removing burnt brick from a kiln, stack, pile, or the like. ALEXANDER A. SCOTT. U. S. 1,474,793, Nov. 20. Apparatus of the kind described, comprising a brick-carrying receptacle, means coöperating with said receptacle to extend therefrom, and engage the rows of brick remote from said receptacle, said engaging means constituting brick removing means to transfer brick from a stack to the receptacle, and including an endless conveyor, having brick moving devices thereon, said endless conveyor being arranged for variable vertical positions with regard to the brick.

Refractories

Bauxite and aluminum in 1922. JAMES K. HILL. *U. S. Geol. Surv. (Mineral Resources of the U. S.)*, [1], 87-96(1922).—The domestic production of bauxite increased 122% in 1922 over 1921. The amt. produced was not as great as in 1920. The increase in the eastern fields showed a revival of the aluminum salts indus. The main producing states for bauxite in 1922 were Ark. and Ga. In the last few yrs. high alumina clays have been substituted for bauxite in mfg. refrac. The main source of these clays is Mo. Three grades of clay contg. 55%, 65% and 75% Al_2O_3 are regularly handled. The U. S. produces more bauxite than the rest of the world. The diaspore deposits of Mo. are being rapidly developed. 40,000 tons of diaspore clay were sold to consumers. Diaspore in cryst. form is of commercial interest. Diaspore can probably be used for the manuf. of abrasives and aluminum salts. Kyanite, sillimanite and andalusite, aluminum silicates containing more than 60% Al_2O_3 , can probably be substituted in some cases for diaspore and bauxite. Large deposits of kyanite have been discovered in Wyo. and Ariz. Alunite is being mined and treated in Utah for potash. Some of the by-product Al_2O_3 is being used for the manuf. of refrac. Some data are also given on the production and consumption of bauxite for the various industries. T. N. McV.

Lining acid electric furnaces. J. M. QUINN. *Iron Age*, 111 [16], 1101-2(1923).—Careful selection of mat. for lining an acid elec. fur. is essential. Two grades of ganister are available, crushed and ground. The former is $\frac{1}{2}$ in. mesh with 50% smaller than $\frac{3}{8}$ in. The latter is $\frac{1}{4}$ in. mesh with a large propn. of fines. Crushed ganister is the more refrac. of the two. Silica sand may also be used. Glutin, molasses and water glass are used as binders with these mat. Silica brick are very satisfactory for linings. The best method for lining an acid fur. is to use high grade silica brick for the bottom and side walls. The brick should be laid dry, leaving room for expansion. The fur. should be heated up gradually until the brick just begin to melt. The bottom should be burned in layer by layer with moistured silica sand. The cup shaped bottom is preferred to the saucer shaped. A fur. can be lined at less expense by using rammed-in ganister instead of silica brick. Directions are given for ramming in the ganister lining and burning it in. Silica brick are usually used in the roof. The author advises against the use of insulation. M. E. M.

Acid electric steel furnace operation. J. M. QUINN. *Iron Age*, 111 [17], 1177-9(1923).—The scrap charged should be slightly below the max. limits for sulphur and

phosphorus, and not too high in carbon. Charge all the scrap at one time, placing large pieces and those highest in carbon on the bottom. With very rusty scrap, free from sand, some silica sand should be shoveled in to prevent the charge attacking the lining. It is possible by careful melting and selection of scrap, to have completely deoxidized metal in 10-15 min. If trouble occurs, and the first test shows carbon over 1%, it is well to pig the heat. If it is decided to work the heat, ore or scale is added carefully, to decarburize the metal. The black oxidizing slag remaining should be removed from the fur. if of large vol., and a new slag made of clean silica sand. While the slag is black both it and the metal contain oxides, which must be reduced. This is done by throwing fine coal or coke on it. Some SiO_2 is reduced under the arc, the nascent Si produced helping to deoxidize the steel. Other reducing agents sometimes used are ferrosilicon, ferromanganese, aluminum, and lime. When the metal is completely degasified, the alloy additions made, and the correct temp. reached, it should be poured from the furnace quickly, as any delay will make a thick, unwieldy slag. M. E. M.

Effect of carbon monoxide on refrac. ANON. *Metal Industry* (London), **23**, 472(1923).—Large scale expts. with electro-thermic dry distillation process for treatment of zinc ores recently undertaken by Mississippi Valley Expt. Station of the U. S. Bureau of Mines have been hampered by rapid disintegration of condenser linings of ordinary fire brick. This disintegration was due to the action of carbon monoxide which caused increase in volume of the brick by deposition of carbon around iron oxide particles in the refrac. mat. Disintegration was avoided by the use of iron-free refrac. mat. R. J. A.

Dolomite for refractories. ANON. *Metal Industry* (London), **23**, 460(1923).—Research work on the utilization of dolomite in refracs. is being continued by U. S. Bureau of Mines at Columbus, Ohio. The main problem being studied is to combine the lime in dolomite so it will be non-slaking and at the same time hold up the refracs., thereby rendering available abundant deposit of dolomite for use as a basic refrac. Previous work has indicated that one of the best fluxes is alumina-iron flux. More recent work has consisted in slaking lime tests on varying proportions of dolomite and alumina-iron flux; 5 to 50% of flux was used and the refrac. properties as well as slaking tendencies were studied. After the best propn. was detd. bricks were made and the proper firing procedure then studied. As a result, a compn. has been found which, when compounded with proper binder and properly burned, produces a strong non-slaking brick of high refractoriness. The bricks are satisfactory except that uniform shrinkage has not been completely attained. R. J. A.

Refractories for the aluminium industry. R. J. ANDERSON. *Metal Industry* (London), **23**, 441-2(1923).—(Abstr. of paper before Refrac. Division, AMER. CERAM. SOC.) A. discusses refracs. for melting substantially pure aluminium and aluminium alloys, both from the point of view of the setting for furs. and use as the containing vessel or hearth. While req. melting temps. are low, the corrosive action of liquid aluminium is great, causing failure of refracs. Carbon is used for lining furs. for the electrolytic reduction of primary aluminium. This is remelted for pigs or ingots in reverberatory type furs. Reverberatory fur. with high-grade fire brick lining are usually employed in rolling-mill practice for melting substantially pure aluminium. Alloys are usually melted in iron-pot or crucible furs. unless production is large, when reverberatory fur. are used. The various types of furs. used in light-alloy foundry practice are discussed. The iron-pot fur. is most favored; in this, the shell is lined with fire brick and the alloy melted in a cast-iron vessel, usually made of ordinary gray foundry iron, but sometimes of a mixt. of 40% semi-steel and 60% foundry iron. The av. life is about 40 heats. Further research is needed on question of refracs. and contg. vessels for melting in die casting and permanent-mold casting practice. Present iron-pot methods are not satis-

factory owing to dissolution of iron. Alundum linings are not successful. The linings for furs. in secondary smelting of aluminium and aluminium alloys is an important factor. The life of fur. linings in secondary work is low owing to local burning. Reverberatory, crucible and iron pots are used, and requirements are severe owing to the high temp. generated by the oxidation of aluminium and the use of fluxes which are destructive to linings. R. J. A.

The commoner refractories. C. E. MOORE. *Metal Industry* (London), **23**, 458 (1923).—(Abstr. of paper before Birmingham Met. Soc.) M. calls attention to the dangers arising from vol. changes in fire bricks at different temps., involving buckling of arches in furs. The conversion of quartz in silica brick is much more slow than in ganister, but silica brick requires very careful treatment during htg. and cooling; it does not usually deform until 1500° is reached. An increasing amt. of semi-silica bricks contg. 80% silica is being used, which are very suitable for some purposes; these are being employed to an increasing extent in the U. S. for coke ovens. An efficient refrac. must resist slag action and compression at alternation of temp., and must also stand up well to cutting flames and gas impact. It is important to use the highest temp. possible in manuf. of bricks so that failure in use at high temps. may be prevented. In the U. S. where the use of oxygen is desired for fur. work, the greatest difficulty is to find refrac. to withstand much higher temps. which the employment of oxygen involves. R. J. A.

The care of brass foundry crucibles. C. F. HOPKINS. *Metal Industry* (London), **23**, 459-60(1923).—(Abstr. of paper before Phila. Foundrymen's Assoc.) H. discusses the storage, drying, and annealing of brass-foundry crucibles, and their treatment in the fur. Instances are cited where proper annealing markedly increased the life of crucibles. It is pointed out that handling of crucibles, in many foundries, before being used, is bad. The effect of furnace design upon crucible life is discussed. Methods of handling crucibles are taken up, and sketches illus. correct and incorrect methods of handling with tongs. Crucible life is greatly affected by rough and improper handling R. J. A.

Preparation of super-refractories. ANON. *Metal Industry* (London), **23**, 465 (1923).—Work on the development of refracs. from artificial sillimanite is in progress at U. S. Bureau of Mines, Northwest Experiment Station, Seattle, in coöperation with ceram. trade interests. The best compd. found is one a little richer in alumina than pure sillimanite. R. J. A.

Graphites for brass melting crucibles. R. T. STULL AND L. E. GEYER. *Metal Industry* (London), **23**, 466(1923); also *The Metal Industry* (N. Y.), **21**, 477-8(1923); (Abstr., U. S. Bur. Mines, *Rept.* **25**, 42(1923).)—Tests on bond clays had previously indicated that Mo. pot clay and Ill. kaolin were better than Klingenberg clay. Tests were next made to det. the value of American graphites for crucible making as compared with foreign ones. Mo. pot clay was used, and crucibles were made up with graphites from various domestic sources, and with Can., Ceylon, and Madagascar graphites. These crucibles were then tested in brass melting practice, and record kept of the failures. The most frequent cause of failure was pin holing, which usually developed at, or below, the slag line. Cracking was also a prominent cause of failure. The crucibles made of domestic graphite compared well with those made of the foreign. R. J. A.

Durability of refractories. W. J. REES. *Metal Industry* (London), **23**, 414-5 (1923).—(Abstr. of paper before Birmingham Met. Soc.) The selection and use of refrac. mats. cannot be placed on an adequate basis until phys. and chem. properties can be specified and tested in measurable quantities; this necessitates a clear understanding of the conditions that the mats. are called upon to meet. Failures of refrac. mats. are placed in 4 classes; viz., (1) unsatisfactory qualities including lack of uniformity; (2) faulty selection; (3) faulty treatment due to accidents, carelessness or ignorance; and

(4) absence of factor of safety. Failures under the first two classes should be capable of being completely eliminated and those due to faulty treatment capable of elimination to a marked extent by proper training or a bonus to operators, based on the life of refracs. or pots. Durability is dependent upon 9 factors; *viz.*, (1) softening temp.; (2) mech. strength at normal and high temps.; (3) thermal or reversible expansion; (4) permanent expansion or contraction; (5) resist. to abrasion; (6) resist. to slag attack; (7) permeability to gases and vapors at high temp.; (8) resist. to abrupt changes in temp.; and (9) changes in properties after prolonged heating. In modern by-product coke ovens the mech. strength of silica bricks at high temps. is a consideration of importance to oven builders. The amplification of existing tests and provision of others is desirable. Many structures collapse through careless heating and the use of unsuitable cements. Av. durability of refracs. is greater than formerly owing to scientific investigations, but good practice will be greatly promoted by close collaboration between makers and users.

R. J. A.

An examination of refractories by the oxygen blow pipe. ALGERNON LEWIN CURTIS. *Trans. Ceram. Soc.*, 22 [2], 199 (1922-23).—It is sometimes necessary to examine quickly the refrac. qualities of raw mats. and to compare different mats. one with another during examn. In the ordinary method of test a prospective refrac. undergoes ultimate chem. anal., and if then considered satisfactory cones of the mat. finely ground are made up and exposed to varying temps. The result of such tests gives a percentage of total fluxes, and a number of distorted test pieces, which have undergone more or less change, according to the temps. at which they were exposed. Although the above combination of tests is an efficient one, the time and expense necessary to carry it out render large numbers of such tests a big undertaking. In order to save time when examg. small amts. of refrac. mat., a method was adopted for bringing into use the oxygen-coal-gas-blowpipe. The test piece was exposed to a strong fixed blowpipe flame and test pieces of a briquette nature were used. A camera was thought necessary. A crude wooden stand was improvised to carry the camera and span the lath bed holding the test piece. The idea was to mount in a microscopic table, in place of an Abbé condenser, a tube carrying a short focus telescopic objective of high order. A series of graduated diaphragms was provided in this tube. The function of the telescopic objective and diaphragms was to project an air image of part of the illumined test piece to the plane of the stage of a microscope. Instead of using a body tube in the microscope, a wooden front carrying a metal fitting was substituted, the wooden front forming part of the camera and the metal fitting for a microscopic objective. By inserting a microscopic objective in a metal fitting this objective became a photographic objective, and the air image projected by the telescopic objective became magnified by it, focusing being carried out with the ordinary rack mechanism of the microscope. The camera was designed to give suitable extensions and consequently increased magnification. In making a survey of the whole test, representing 56 test pieces from 7 different mats., and 7 pieces of Seger cones, it was seen that "surface attack" from heat and shrinkage could be readily studied; and those materials first affected by ht. are inferior to mats. which resist attack to the last. The best bauxitic clay tested was less liable to ht. attack than the Scotch fire clays, besides possessing less shrinkage. A distinct difference in quality of such bauxitic clays can be assumed from the difference shown in the heat attack of the three test pieces. Of the four Scotch fire clays, it was seen that one test piece had little claim to a place as a refrac. fire clay. The other fire clays can all claim to belong to the refrac. fire clay group, their chief detriment being high shrinkage.

H. F. S.

Silica bricks for coke ovens. A. H. MIDDLETON. *Trans. Ceram. Soc.*, 22 [2], 169 (1922-23).—Under the foll. conditions, silica brick is recommended as a substitute for

quartzite: (1) In the case of new installations; (2) the renewal of walls where salty coal is used; (3) where ordinary coal is used, but the alterations or repairs are so extensive as to make it possible to alter the whole htg. arrangement as well as to replace the actual walls. The article points out briefly some of the advantages of a silica construction and deals in detail on one point in which silica bricks differ fundamentally from quartzite bricks, namely, their permanent expansion when heated to temps. at which ovens built of silica bricks are frequently operated. The raw mat. and the firing of the bricks are also discussed.

H. F. S.

The behavior of fire clays, bauxites, etc., on heating. H. S. HOULDSWORTH, AND J. W. COBB. *Trans. Ceram. Soc.*, **22** [2], 111(1922-23).—Kaolin, a Dorset ball clay, Farnley fire clay, a Scottish fire clay, and Ayrshire bauxite clay were examd. It appeared that 7 definite shrinkage points existed between 15–1100°C for kaolin, viz., at 530, 625, 700, 880, 950 and 1060°C, the clay having a very small rate of contraction at intermediate temps. when subjected to a prolonged htg., but expanding (reversible thermal expansion) when the htg. was more rapid. The shrinkages at 625, 700, and 780, were considerably smaller than those taking place at 530, 880, 950, and 1060°C. For Farnley fire clay pronounced shrinkage points occurred at 540, 880, 950, and 1080°C together with a slight shrinkage about 100°C. These changes were irreversible, as is seen from the cooling curve, which, however, shows the contraction on cooling between 600°C and 550°C due to the inversion of β to α quartz. Atlas fire clay behaved very similarly to the Farnley fire clay, giving marked irreversible shrinkages at 100–140°C, 540, 880, 980, and 1050°C with a rapid reversible expansion between 575° and 610°C due to the inversion of the free α quartz of the clay to β quartz. It will be seen that Ayrshire bauxite clay, an aluminous clay, differed from the siliceous clays examd. both in possessing a larger number of shrinkage points, viz., at 100, 530, 620, 700, 880, 950, and 1015°C, and also in the larger contractions which took place at these temps. The shrinkage of clays is not a continuous process but one which takes place in a number of stages, each stage being completed at a definite temp. The shrinkages of considerable magnitude are, generally speaking, found at almost the same temps. in the different clays. Some points, such as the absence of the 530°C shrinkage in ball clay, have no doubt a significance, but one which can not be explained at present. Kaolin and all the clays and shales examd. show distinct heat absorption at a temp. of 500–530°C and heat evolution at a higher temp. This heat evolution occurs at a temp. of 1060–1130°C with pure alumina made by calcining aluminum nitrate at 700°C, but at a temp. lower to an extent of about 100°C with the bauxites and clays, possibly on account of the impurities associated with the alumina in combination or some form of solution effective for the purpose. Most of the mats. show heat absorptions at temps. below 500°C, presumably due to the loss of water from colloid subs. The phenomena observed with the clays are not primarily dependent on the presence of silica. They are noticeable with alumina and with a red bauxite practically free from silica, though the ht. evolution then took place at a higher temp. For some reason, although alumina calcined at 700°C and the bauxites and clays show marked heat evolution at about 1000°C as noted above precipitated alumina gave no sign of it. It may be that the change responsible for the ht. evolution had occurred with the pptd. alumina before it was heated in our app., but that with aluminum nitrate, or silicate the presence of other mat. associated with the alumina deferred the change.

H. F. S.

Heat insulating materials for electrically heated apparatus. J. C. WOODSON. *Trans. Amer. Elec. Soc.*, **43**, 20 pp.(1923).—This paper is a general discussion of the subject. The author classifies processes into 5 temp. ranges between 0 and 1100°C and lists the insulating mats. applicable to each temp. range. The simpler formulas used in calcg. heat flow are given and discussed. Around 100 commercial insulating

mats. are listed with their important properties. All these insulators are made of about a half dozen different raw mats. in most of which the insulating property is caused by tiny entrapped dead air spaces in their structure. Larger air spaces between walls may tend to increase rather than decrease the heat loss, however, due to convection currents and radiation carrying the heat through them. Besides low heat condy., low sp. gr. and sp. heat, good mech. strength, etc., are desirable properties in insulating mats. In general, compared to electrical insulation our present mats. and data for applying them for the solution of heat insulating problems are still very imperfect. B. M. L.

Terra Cotta

Industrial architectural practice. SYMPOSIUM. *Arch. Forum*, 39 [3], 83-151 (1923).—A whole number devoted to industrial architecture including following topics. Industrial architecture in concrete by CASS GILBERT. The choice of an industrial building site by MAURICE M. OSBORNE. General principle of planning. Choice of type of construction by JOHN R. NICHOLS. Fire prevention and protection and data on fire and accident prevention requirements by C. STANLEY TAYLOR. Roof types and roof surfaces by WALTER F. BALLINGER. Industrial flooring materials by CHARLES A. WHITTEMORE. Natural lighting by WM. R. FOGG. Welfare provisions by CHAS. L. CLOSE. Plumbing by JAMES A. COTTER. Heating and ventilation by CHAS. A. FULLER. Power provision and steam plant design by ALLEN HUBBARD. Artificial illumination by A. L. POWELL. Electrical power by JAMES A. MCHOLLAN. F. T. H.

Whiteware

The production of porcelain for electrical insulation.—V. F. H. RIDDLE. *Jour. Am. Inst. Elec. Eng.*, 42, 858-63 (1923); see *Ceram. Abst.*, 2 [9], 199 (1923); 2 [11], 258 (1923).—Methods of forming, drying and glazing the insulator shapes are described. Dust or semi-dry pressing is used on low-tension insulators such as switch bases, lamp sockets, etc. The dried filter press cakes are crushed, dampened, pulverized and pressed in steel molds. The density of this product is not so great as that formed from the plastic batch, but accurately sized, difficult shapes can be made. Throwing, jiggering and turning from pugged blanks are processes in which the body is shaped while in the plastic condition, and might be termed "plastic forming." Pieces formed in this manner are trued up while still damp but stiff enough to hold their shape. A special method in use at the author's plant for spark plug porcelains is known as dry process turning, and consists of revolving the bone-dry blank on a lathe, and facing it with a rapidly revolving grinding wheel. The drying shrinkage is eliminated by this process. The "hot press die" method is used on insulators with thin-walled petticoats. Here the plaster of Paris mold, having the shape of the outside or top of the insulator, is placed on a horizontally revolving wheel, the plastic clay being carefully pressed in so as to conform with the mold. A heated metal part is forced down upon the clay in the revolving mold, and shapes the spinning clay into proper form for the bottom of the insulator. The hot metal causes steam to be formed from the water in the plastic body, and this acts as a lubricant preventing the clay from tearing, and also making possible an extremely thin petticoat or wall. Casting from porcelain slip in plaster molds, a method widely used in the potteries, has been applied during the last five years to the forming of heavy insulators (high-tension). Density, uniformity and freedom from strain are the advantages conferred by this process. In the drying of elec. porcelain, modern methods of controlling humidity, temp. and circ. of the air, particularly as exemplified by the tunnel humidity drier, have reduced the time of drying of the larger pieces from weeks to days, and on all sizes of ware the losses have materially

decreased. Glazing of the insulators is described, and formulas given for a brown or "Albany slip" glaze and a clear white glaze. Low thermal expansion and high ht. condy. are valuable properties in both body and glaze, as they tend to minimize "crazing" and "shivering." In connection with glaze-fit, mention is made of the author's work on the application of tensile test specimens, in which it was clearly shown that when the expansion of the glaze departs considerably from that of the body, the tensile strength is less than normal. This may account for the failure of insulators in actual service, due to strains set up by fluctuations in temp.

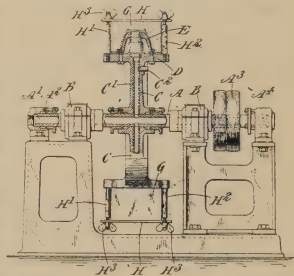
A. F. G.

PATENTS

Insulator. WALTER T. GODDARD. U. S. 1,474,256, Nov. 13. A column type insulator comprising a series of annular insulating units superposed one upon the other and each provided with a flange cut away to form a lip for receiving portions of successive convolutions of a conducting coil, interlocking means between adjacent units acting to prevent their relative movement, and tension rods formed of sections of insulating mat. and connecting the uppermost and lowermost units of the series and acting to hold all the insulating units in a state of compression.

Apparatus for casting or molding pottery and like articles. JOSEPH FORSYTH GIMSON. U. S. 1,474,432, Nov. 20. Apparatus for casting or molding pottery and like articles including in

combination a hollow rotatable shaft, a hollow arm radiating therefrom and having its interior in communication with the interior of the shaft, an absorbent mold carried by the hollow arm, means for supplying the material to be treated to the interior of the shaft and thence through the hollow arm to the mold, and means for rotating the shaft, the moisture being removed from the mat. and absorbed into the mold under the action of the centrifugal force set up by the rotation of the app. as set forth.



Equipment and Apparatus

A new heat insulator, balsam-wool. HOWARD F. WEISS. *Concrete*, 23, 149-50 (1923).—By disintegrating waste wood and rearranging the fibres so as to obtain a max. of dead air cells, there has been developed an insulating mat. which has a lower thermal conductivity than Balsa, the lightest natural wood. Thickness (inches) required to equal $\frac{1}{2}$ in. of balsam-wool: balsam-wool, 0.50; sheathing lumber, 1.58; common brick, 8.00; sheathing paper (solid), 1.59; lime plaster or stucco, 17.00. F. T. H.

A thermostat for moderate and high temperature. J. L. HOUGHTON AND D. HANSON. (Collected Researches.) *Natl. Phys. Lab.*, 15, 53-65(1920); *J. Inst. Metals*, 14 (1915) and 18 (1917).—Describes an air bulb thermostat made of glass or fused silica, the expansion and contraction of the air making and breaking a mercury contact which operates a solenoid controlling the resistance in the fur. circuit. E. S.

A carbon tube furnace for testing the softening points and compressive strengths of refractories. E. GRIFFITHS AND E. A. GRIFFITHS. (Collected Researches.) *Natl. Phys. Lab.*, 15, 19-28(1920); *Trans. Faraday Soc.*, 12(1917).—A carbon tube resistance furnace packed with zirconia and magnesia using N to maintain neutral atmosphere. The load is applied by means of springs and transmitted to the specimen through a yoke and carbon block. E. S.

Pyrometer standardization. E. GRIFFITHS AND F. A. SCHOFIELD. (Collected Researches.) *Natl. Phys. Lab.*, **15**, 31-47(1920); *Trans. Faraday Soc.*, **13**(1919).—A review of the methods for standardizing various types of pyrometers. E. S.

An economical furnace for fusions. POZZI. *Corr. dei Cer.*, **4**, 10(1923).—A furnace constructed for the use of coal as a fuel in the smelting of frits working in a continuous manner. It is designed with a feed of the mix in at one side and the flow of frit out on opposite. The furnace requires but 300 kgs. of coal a day and the product is completely fused and the temperature possible to reach is 1300°C. The operation is rapid and a regenerative system is used with a very economic production of smelter. No drawing of furnace given and no amount of material produced. S. S. C.

The strong arm of industry. ANON. *Cement & Eng. News*, **35** [9], 26-9(1923).—A discussion of modern power shovels, giving opinions on relative merits of steam, electric and gasoline-electric types. It is conceded that electric and gasoline-electric are most economical and advantageous for small installations, while steam is still best type for the larger shovels. F. T. H.

Automatic burner control. ANON. *The Foundry*, **51** [23], 968(1923).—Describes the F. J. Ryan & Co. automatic temperature control for oil and gas fired furnace. The unit consists of a valve operation in conjunction with a magnet, the movement impulse originating in a thermocouple within the heating chamber, and connected through a recording pyrometer and control panel. It is adaptable to high or low pressure burners. Illus. M. E. M.

Experimental study of ball-mill grinding. D. H. FAIRCHILD. *Eng. & Min. Jour. Press*, **116** [20], 845-6(1923).—F. studied the action in ball mills with heavy glass end plates by observation and by motion pictures. The factors in ball-mill action are impact crushing, attrition and dead weight. Impact crushing is by far the most important. In the usual ball mill of circular section this action takes place largely only in the upper surface zones of the charge, with large zones at the center and next the walls comparatively inactive. The circular section gives little wear on linings and best distribution of loading, but varied forms may be developed that will cause "a more rapid change of mill content" and "more effective agitation within the ball mass." B. M. L.

Rubber lining for ball mills. A. B. PARSONS. *Eng. & Min. Jour. Press*, **116** [12], 489-90(1923).—Originating in observation of the remarkable wearing power of automobile tires over rocky roads, the idea of using similar rubber linings for ball mills has been developed and applied successfully at the Nipissing Mining Company's plant near Cobalt, Ontario. The idea has been patented. The rubber used is not hard but rather soft, tough and well vulcanized. A 4 x 20 ft. mill, charged with 20 tons of 1.25" iron balls and used for regrinding sand from a Dorr classifier, was lined with a 5/8" layer of rubber in Jan., 1923. After steady use it was still in first class condition in August, 1923. The cost of a 5/8" rubber lining is slightly less than that of a 2" iron lining. Such a rubber lining is much easier to install or replace, has about 1/20 the weight of the iron and will last at least as long and probably much longer. The rubber lining also gives much increased grinding capacity and somewhat less ball consumption. B. M. L.

A thermopile for measuring radiation. W. J. H. MOLL. *Proc. Phys. Soc. London*, **35**, 257-60(1923).—The thermopile is designed to be quick-reading, sensitive, and free from zero-errors. The cold junctions are in contact with metal masses which keep down their temperature, and in order that the hot junctions may have small heat capacity the bimetallic strips composing the thermopile are made of plates of constantan and manganin, Ag-soldered along an edge, rolled in a direction parallel to the edge into thin foil, and then cut into strips perpendicular to the edge. C. C. V. V. (C. A.)

Electric furnace operation. ANON. *Elec. World*, **82**, 727(1923).—Discussion of costs, linings, suitable size, etc. by a number of electric furnace experts. C. G. F. (C. A.)

Progress in the manufacture of steel in the electric furnace. CLAUDEL DE COUS-SERGUES. *Rev. métal.*, 20, 417-22(1923).—Discussion of the advantages of the elec. furnace with a description of the various types and their merits and disadvantages.

A. P.-C. (C. A.)

A new colorimeter with absolutely symmetrical rays. K. BÜRGER. *Z. angew. Chem.*, 36, 427-9(1923); 3 cuts.—An immersion colorimeter, mounted on a stand like a microscope, the rays from the 2 tubes being thrown on the same field for comparison. Directions for operating are given.

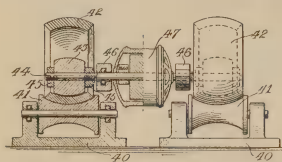
J. H. M. (C. A.)

New liquid manometers and their use in heating and ventilating practice. E. NICKEL. *Feuerungstechnik*, 11, 137-40(1923).—The form of draft gage described has a cylindrical well with axis horizontal, so that the gage can be used at different inclinations without affecting the zero reading.

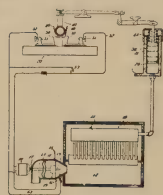
E. W. T. (C. A.)

PATENTS

Roller-grinding machine. JOSÉ FERENCZ. U. S. 1,475,693, Nov. 27. A rolling mill comprising drums having open ends mounted for free rotation around a common horizontal axis, a grinding roller in each drum held by gravity in contact with the inner periphery of its respective drum, a shaft extending through said open ends and upon which said grinding rollers are rigidly secured, oscillatory guide arms for said shaft permitting radial displacement of the grinding rollers in relation to said axis, means for rotating said shaft with said grinding rollers; said rotating means including a motor suspended from said shaft, the weight of said motor, shaft, and grinding rollers being sustained upon the inner periphery of said drums; whereby a constant pressure is exerted against said drums independent of the revolving speed of the rollers.



Controller for fuel-oil burners. FINN S. HUDSON and EDGAR G. RHODS. U. S. 1,475,433, Nov. 27. In a device of the class described, a steam-generating boiler having a fire-pot, a fuel-oil atomizer, an air-blower to deliver the fuel to the fire-pot, an elec. motor for the blower, an electric circuit for the motor having a switch, a cylinder having a piston and communicating with the boiler below the piston, a spring restraining the piston in its cylinder, an adjustable plate to vary the tension of the spring, a cap on the piston having an adjustable pin, and a lever coöperating with the pin and switch to open the latter when the piston is protracted and to close it when the piston is retracted.



Dry pan. DAVIS BROWN. U. S. 1,476,143, Dec. 4. In an improved dry pan grinding mach., the combination of a vertically mounted rotatable pan, a rim on the periphery of said pan, a stationary rim located above and defining, with said first rim, an opening through which ground mat. may pass, and means for moving said rims relatively to each other to vary the width of said openings.

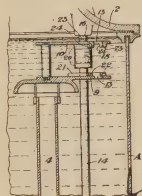
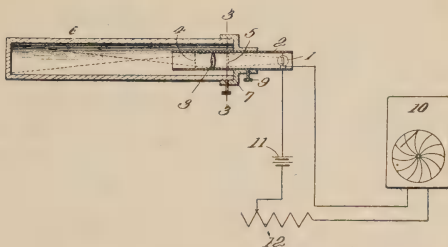
Electric resistance element. FRANK A. FAHRENWALD. U. S. 1,475,942, Dec. 4. An elec. resist. element made of an alloy of iron from about 16% to about 20% of chromium and about 1% to about 3% of manganese.

Apparatus for measuring high temperatures. JULIAN L. SCHUELER and CHESTER A. KELLOGG. U. S. 1,475,365, Nov. 27. In device for measg. high temps., in combination, a tubular body, a light sensitive cell in said body, a lens in said body, and means

connected with said tubular body arranged to exclude light interfering media between said means and said cell and when subjected to ht. changing in degree of intensity of color which change affects the resist. of said cell.

Liquid-measuring apparatus.

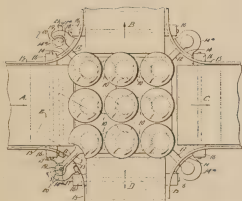
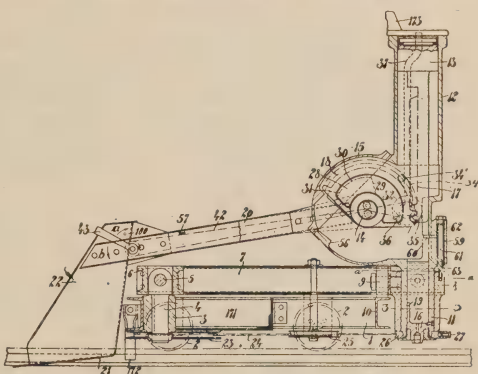
GEORGE W. MACKENZIE. U. S. 1,475,844, Nov. 27. Locking mechanism for a liquid measg. app. of the class shown consisting of a



an vertically maintained rising and falling float, a vertically and annularly movable element having locking abutments for engagement by the top and bottom of the float, and means for locking the movable element at varying heights. In a liquid measg. app. having a vertically and rotatably movable supply and return conduit, a vertical guide rod, a freely movable float thereon, float-engaging plates connected with the conduit extending below and above the float in slotted engagement with the guide rod and having annularly arranged locking abutments for engagement by the float, and means for locking the conduit at varying heights.

Loading machine for ores and the like. THORE ROBERT EUGEN RUNDQVIST.

U. S. 1,475,888, Nov. 27. A mach. for loading ores and the like into cars on mine tracks, comprising in combination a carriage frame, wheels for supporting said frame, another frame, pivotally mounted on said carriage frame to sweep horizontally thereover, an upstanding power motor, pivotally mounted at the free end of said other frame to rotate around a vertical axis in relation thereto, a horizontal crank shaft of said motor, arms attached to said shaft, and a bucket carried by said arms. In a machine for loading ores and the like into cars on mine tracks, the combination with an upstanding cylinder, of a piston therein, means for introducing motive power on the upper side

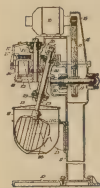


of said piston, a piston rod, a crank shaft, arms attached to said crank shaft, a bucket carried by said arms, and a connection between said piston rod and said crank shaft to cause the said bucket arms to swing upwardly upon the downward movement of the piston.

Transfer device for conveyers. SAMUEL OLSON. U. S.

1,475,962, Dec. 4. In combination with a plurality of conveyers arranged with adjacent termini, a transfer device comprising a group of driving members interposed between said termini and all mounted to rotate about axes slightly inclined from strictly vertical direction for exposing upwardly a limited portion of the circular driving surface of each member which extends in a plane substantially perpendicular to the axis of rotation of the member.

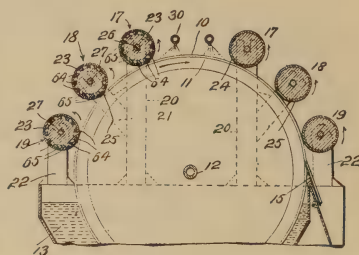
Beater. FREDERICK WESTERMAN. U. S. 1,475,978, Dec. 4. A beating app. comprising a receptacle having a cover provided with a central opening, a beater shaft set oblique to the vertical and entering the receptacle through the opening in the cover, a paddle on the shaft and in the receptacle, and means above and independent of the cover for supporting and rotating the shaft on its axis and also for bodily moving the shaft in a conical orbit having its apex substantially at the opening in the cover.



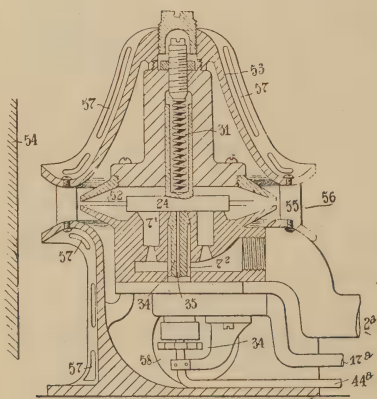
Filter. LOUIS C. ROLLS. U. S. 1,475,244, Nov. 27. A filter having, in combination, a continuously moving filtering surface, means for creating a vacuum at the filtering surface, means for covering the filtering

surface with mat. to be filtered, means for supplying wash fluid to the surface of the mat., and a series of rolls mounted to rest upon the surface of the mat. and interposed in the path of travel of the fluid, all said rolls, except the last one, being provided with channels for the passage-way of the fluid past the rolls.

Mechanical vaporizing oil burner. JAMES WALLACE TYGARD and ELIZABETH ANN TYGARD. U. S. 1,473,891, Nov. 13. In a mech. vaporizing oil burner for the production of mixtures of air and liquids, the combination of a hollow fixed member, a vibrating member located within the body of the fixed member in such manner as to divide it into substantially two compartments, whereby the movement of the vibrating member opens communication

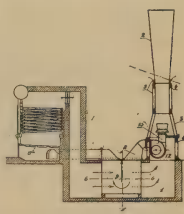


between said compartments when the vibrating member is actuated either by vacuum or pressure and automatically closes communication when pressure is released or vacuum broken, regulatable means for controlling the action of the vibrating member, means whereby a regulatable amount of gaseous or liquid fuel and air is admitted to one compartment, means whereby their incorporation into a finely pulverized homogeneous combustible or stable vaporous mixture is effected when passing from one compartment to the other, a suitable refrac. or protective enclosing envelope or cover having suitable passages for the introduction of cooling mediums and suitable annular openings through the side of said cover



adapted to conduct the combustible vaporous mixtures generated in the carbureting device to the refractory wall or lining against which they burn when ignited.

Induced and forced draft apparatus. EMILE PRAT. U. S. 1,473,870, Nov. 13. An app. for the production of draft in fur. by simultaneous induction and blowing, comprising a chimney flue, a casing arranged within the chimney flue and divided into two compartments having independent central inlets and peripheral outlets, a rotatable shaft in said casing, bearings supporting said shaft at each end on opposite sides of the flue, fan sections carried by the shaft and operating in the respective compartments, a delivery nozzle on one of the sections



opening into the chimney at the axes thereof, said fan sections communicating with the interior of the chimney flue and being transversed by only a portion of the combustion gases from the fur. and adapted to produce a draft by ejector action in the chimney, the other fan section having its inlet in communication with the atmosphere and adapted to direct an air blast to the grate of the fur. See *Ceram. Abs.*, 2 [11], 263(1923).

Kilns, Furnaces, Fuels and Combustion

Use of pulverized coal in open-hearth furnaces. R. H. LOWNDES. *Mech. Eng.*, 45 [11], 651-2(1923).—The cost of producing steel in open-hearth fur. burning pulverized coal at the Atlantic Steel Co. is greater than when natural gas is used. The life of the checker work is shortened by the use of pulverized coal. In a report on Pulverized Coal Systems in America, compiled by Leonard C. Harvey, and published in London in 1919, under the heading "Opinions of Users" occurs the following statement: "Have found the average life of checkers for various fuels in the open-hearth fur. to be: Natural gas, 1000 hts.; producer gas, 350 to 500 hts.; oil, 350 to 500 hts.; and pulverized coal, 225 to 250 hts.

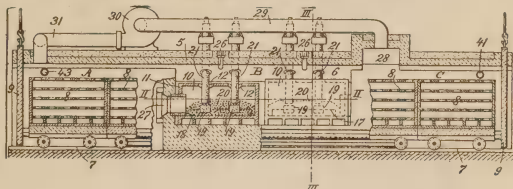
C. J. H.

Symposium on heat transfer. ERLE M. BILLINGS. *Science*, 58 [1508], 416 (1923).—A symposium on ht. transfer will be held at the spring meeting of the Amer. Chem. Soc. W. H. Adams, of the Mass. Inst. Tech., is chairman of this symposium.

C. J. H.

PATENT

Tunnel kiln. GEORGE HILLARD BENJAMIN. U. S. 1,474,616, Nov. 20. A tunnel oven comprising a main chamber through which goods to be heated can be caused to travel; a htg. chamber on each side of the main chamber, structurally independent of the side walls and roof of the chamber; and means in each chamber for converting and transmitting elec. current into ht.



Geology

The superiority of British china clay. ANON. *Can. Min. Jour.*, 44, 826-7(1923).—The world is still largely dependent on the unlimited supplies of china clays from Cornwall, England, which heads the list both in quantity and quality of production. Gradually increasing competition is noted from many foreign sources. Search for new deposits is active in Canada, U. S., and China. Canada has a good deposit near St. Remy D'Amherst, near Huberdeau, Quebec. It may ultimately supply all the needs of Eastern Canada. A deposit near Foochow, China, close to the South Manchuria Railway, is producing for export about 70,000 T. per annum. The U. S. has relatively few deposits of good china clay so far discovered, which are chiefly in the S. states. B. M. L.

Notes on Canadian minerals—allanite, axinite, columbite, and sillimanite. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Surv.*, No. 16, 29-37 (1923).—Allanite is described from pegmatites at (1) Seguin Falls, Ont., and (2) Labelle Co., Que. They differ considerably in composition. Analyses (E. W. Todd):

| | SiO ₂ | ThO ₂ | CaO | FeO | MnO | MgO | Al ₂ O ₃ | Fe ₂ O ₃ | Ce ₂ O ₃ , etc. | Y ₂ O ₃ , etc. | H ₂ O | Sum |
|---|------------------|------------------|-------|-------|------|------|--------------------------------|--------------------------------|--|---|------------------|--------|
| 1 | 31.88 | 0.44 | 12.94 | 9.56 | 0.74 | 1.03 | 16.66 | 4.91 | 19.58 | 1.64 | 1.33 | 100.71 |
| 2 | 31.94 | 0.52 | 14.76 | 12.13 | 1.10 | 0.32 | 18.18 | 3.80 | 13.44 | 0.76 | 2.99 | 99.94 |

Sp. gr. (1) 3.658, (2) 3.279; n (1) 1.735, (2) 1.650; (1) birefringence 0.01, (2) isotropic. Axinite from Marmora Twp., Hastings Co., Ont. is found in a hornblende schist. Analysis (Todd): SiO_2 41.46, B_2O_3 4.88, Al_2O_3 19.94, Fe_2O_3 0.96, FeO 4.56, MnO 5.44, CaO 19.57, MgO 1.99, H_2O 1.61, sum 100.41, sp. gr. 3.221. The formula $13\text{RO} \cdot \text{B}_2\text{O}_3 \cdot 10\text{SiO}_2$ is suggested for axinite. Columbite. Four analyses (Todd) are given: (1) crystals, Lavers Mine, New Ross, N. S.; (2) Hazaribagh, Bengal; (3) Lyndoch Twp., Renfrew Co., Ont.; (4) massive with visible rutile, Hybla, Ont. All are from pegmatites.

| | Cb_2O_5 | Ta_2O_5 | TiO_2 | SiO_2 | SnO_2 | MnO | FeO | Sum | Sp. gr. |
|---|-------------------------|-------------------------|----------------|----------------|----------------|--------------|--------------|---------------------|---------|
| 1 | 63.08 | 14.48 | 1.47 | 0.34 | 0.22 | 10.44 | 10.46 | 100.49 | 5.613 |
| 2 | 65.49 | 13.89 | 0.66 | 0.10 | 0.22 | 14.12 | 5.59 | 100.22 ¹ | 5.563 |
| 3 | 55.79 | 15.21 | 5.19 | 1.28 | 0.56 | 10.24 | 10.90 | 100.14 ² | 5.431 |
| 4 | 66.60 | 1.74 | 5.22 | 0.64 | 0.36 | 9.06 | 8.61 | 100.01 ³ | 5.147 |

¹ Also 0.15 CaO ; ² Also 0.15 CaO , 0.82 rare earths. ³ Also 1.25 ZrO_2 , 3.44 ThO_2 , 1.68 rare earths, 1.41 H_2O .

Sillimanite crystals, up to $\frac{1}{2}$ inch long, occur in a gneiss at Romaine, Que. The mineral is colorless and transparent. Analysis (Todd): SiO_2 36.70, Al_2O_3 62.73, Fe_2O_3 0.63, sum 100.06; sp. gr. 3.209. E. F. H. (C. A.)

Chemistry and Physics

The oxides of iron. J. D. FERGUSON. *Jour. Wash. Acad. Sci.*, **13** [13], 275-81 (1923).—(1.) The iron phase in the system (H_2 , H_2O , Fe , FeO) was studied in an elec. htd. tube fur. to det. the quantities of oxygen present. Materials used were electrolytic iron and piano wire. The temps. varied from 750°C . to 980°C . Six runs were tabulated. Results indicated that the system does not contain appreciable quantities of O_2 . (2.) The transition temp. of the ferrous oxide phase was studied and found to be somewhat below 577°C . The presence of ferro-ferric oxide in soln. in the ferrous oxide lowers this temp. (3.) Equilibrium constants at 750°C were checked by the stream method. Values were obtained indicating that the oxidation starts with a $\text{H}_2\text{O}/\text{H}_2$ ratio slightly less than .54. This work checked Chaudron's figures very well.

F. C. F.

The thermal conductivity of materials employed in furnace construction. E. GRIFFITHS. (Collected Researches.) *Natl. Phys. Lab.*, **15**, 1-15 (1920); *Trans. Faraday Soc.*, **12** (1916).—Gives a critical summary of earlier determinations of conductivity of fire clay, silica and magnesite brick. In G.'s method the test brick of stand. size is htd. on one face by a bath of molten tin in expts. up to 450° , and above that temperature by pressing it against a flat iron plate forming a portion of the wall of a large uniformly heated muffle. Results by the 2 methods agree though the metal bath gives greater accuracy due to more uniform hgt. Temps. are observed by means of thermocouples and ht. transfer by means of a flow calorimeter provided with a guard ring to protect the calorimeter against sharp temp. gradient. The following values were obtained for conductivity in C. G. S. units: Diatomaceous brick 105° to 502° mean temp., 0.000310 to 0.000461; matted slag wool, 194° to 476° mean temp., 0.000191 to 0.000342; magnesia pipe packing 310° mean temp., 0.00022. E. S.

Properties of powders. VI. Compressibility of powders. E. E. WALKER. *Trans. Faraday Soc.*, **14**, 55-73 (1923).—A method devised for measg. the resist. of powders to compression by static load and blows from a falling wt. Materials used were Pb , NH_4NO_3 , NaCl , TNT , CaCO_3 . Three classes of curves developed showing progress of compression varying with the type of mat. Microscopic examn. shows the extent of the deformation of the crystals. (More work could be done on this.) F. C. F.

Properties of powders. VII. Distribution of densities. E. E. WALKER. *Trans. Faraday Soc.*, **14**, 55-80(1923).—Local d. in columns of compressed powders studied. Various methods of packing compared. Some discussion of the effect of compression and d. on the cohesive power of the powder. F. C. F.

Simple method of determining apparent densities. KENNETH K. DODDS. *Chem. and Met. Eng.*, **29**, 324-5(1923).—Density is defined as the wt. (or mass) per unit volume, or wt. divided by vol. The vol. of continuous, impervious solids is readily found by the loss of wt. when suspended in water, since, by Archimedes' principle, the loss in wt. equals the wt. of an equal vol. of water. We have, then, $D = W_1/(W_1 - W_2)$, taking the d. of water as unity, where D = density, W_1 = wt. in air, W_2 = wt. suspended in water. Porous bodies cannot be so treated, owing to absorption of water, which causes the suspended wt. to be too great by an amount equal to weight of water thus absorbed. This objection could be overcome by weighing body after immersion. By subtracting the suspended wt. from the satd. wt., the absorbed water cancels out, leaving the bulk vol. Thus, $D = W_1/(W_3 - W_2)$, where W_3 = satd. wt. This suggests the method of measg. porosity by boiling in water, but the above process unfortunately is not applicable to the detn. of porosity. Numerical data is given showing apparent d. of coke, carbon, and various types of brick as detd. by the above method and by boiling under reduced pressure for 1 hr. The results agree to several units in the second decimal place.

A. F. G.

Different types of plasticity of clays and kaolins. M. A. BIGOT. *Ceramique*, **26**, 194-8(1923).—B. divides the bonding power of kaolins and clays into 4 classes as follows: (1) Colloidal bonding power caused by extremely fine mineral particles; (2) lamellar bonding power caused by plates of kaolin, mica, etc., in clays; (3) organic bonding mats. as glue; and (4) fibrous bonding properties such as is caused by adding fibrous mat. to a plastic clay. The organic and fibrous bonding mats. make the clay more workable and cause it to be more resist. to breakage in the dry state. The lamellar bonding mats. cause the clay to be more workable in the plastic state and also impart strength to the dry clay. The colloidal bonding properties play an important rôle in ceramics. Those liquid, physical and chem. agents which develop the colloidal properties of clays are known as peptising agents. Those which destroy the colloidal properties are known as peptising agents. Clays and kaolins are more or less colloidal and are partly peptised by water. Plastic clay consists of 2 kinds of subs. One kind absorbs the water and swells and is peptised by the water. The other mat. is too coarse to become peptised and hence is simply coated with water, and does not swell. Petroleum when added to dry powdered clay and pressed into bricks at a high pressure does not develop strength in the clay upon drying but causes the clay to crumble to a powder. This is considered a pektising agent. On drying plastic clay it slowly shrinks and becomes hard. The plastic clay possesses colloidal properties and these colloids become pektised by driving the water from the colloid. The colloids thus pektised give strength to the clay. Plasticity, drying shrinkage, and strength are greatest for clays having the highest colloidal content. A thorough pektisation of the colloids of clay does not take place upon drying. A dry clay adsorbs moist. from the air, this being more from moist air than from dry air. Kaolins washed from disintegrated rocks of sand and mica do not have much bonding power. Clays removed from wet banks are on the other hand very plastic provided they are not too rich in sand and mica. All clays and kaolins contain organic matter and bacteria. Under the influence of time, wetness, and bacteria the colloidal portion of clays are increased. The Chinese allow their clays to remain in damp cellars for 100 yrs. before using them for pottery. By pressing and heating a pektisation of the colloid takes place. It was found that extremely plastic clays became insol. in water after heating to 400°C. Lean clays and kaolins first became insol. in water after

heating to 500°C. Slaty clays first became insol. after heating to 600°C. Hot water produces less pektisation than press. and heat. Slaty clays are very difficult to pektise especially if they contain bituminum. If a bituminous slaty clay is pektised by heating to 600°C and then is treated with chemicals to remove the bituminous matter the clay becomes colloidal again and becomes pektised at 400°C instead of 600°C as was necessary for the bituminous clay. B. also detd. the effect of colloids in clay upon the resist. of the ware made from it to freezing. He used a brick clay containing considerable sand and mica as impurities. Three types of bodies were studied. (1) The powdered clay was heated to 150°C and pressed into bricks at this temp. with a press. of 700 kg./cm.² (2) The powdered clay was dried at room temp. and mixed with 4% water and pressed at 700 kg./cm.² (3) The clay was mixed to normal consistency with water and pressed into brick at 15 kg./cm.² Separate samples of each of the 3 groups were fired at 900° and 1000°C. These bricks were saturated with water and frozen at -15°C for 4 hrs. This was repeated until the brick disintegrated. The results showed that bricks of groups 1 and 2 failed before the tenth treatment while those of group 3 withstood the tenth treatment. The brick of group 1 had practically no colloids but owing to the high pressure which it received it withstood the freezing test 4 hrs. The trial pieces of group 2 developed some colloids and this together with the press. caused it to withstand the freezing treatment for 8 hrs. In group 3 the max. amt. of colloids were developed and hence this brick withstood the freezing treatments longest. The brick of groups 1 and 2 had a very good appearance and were slightly less porous than those of group 3 but in spite of their lower porosity they failed in the freezing tests due to lack of pektised colloids. In making this clay into bricks and roofing tile it was found that a product most resist. to freezing could be made by making these from plastic clays. By using the dry press process about 6 hrs. can be saved in the time of manuf. but the product made in this manner is not resistant to freezing unless made from an exceptionally plastic clay. It is true that the bricks can be made more resist. to freezing by firing them to a higher temp. but by so doing the color is often spoiled and the fuel consumption increased. If a clay is dried in an atmos. satd. with H₂O a vapor press. is exerted in the clay which causes more colloids to become peptised and hence in drying develop greater strength. Ware dried in moist air becomes pektised at 400° to 450°C and after firing at 900°C is very resist. to frost. The drying in moist air requires 48 hrs. at 45°C and not quite 8 hrs. at 90°C.

H. G. S.

The plasticity of crude gum. MARZETTI. *Giorn. Chim. Ind. ed Appl.*, 5 [7], 342 (1923).—The plasticity is measured in an app. by which temp. and press. are regulated and the rate of flow through an aperture measured during time intervals. By this means the control of the heating of gum and an idea of the effect of heat on it is obtained. Drawing of apparatus is given.

S. S. C.

Rapid technical determination of Fe₂O₃ and Al₂O₃ LUCHESSI. *Giorn. Chim. Ind. ed Appl.*, 5 [1], 12 (1923).—The ppt. of hydrate of Al₂O₃ and Fe₂O₃ obtained with NH₄OH in presence of NH₄Cl is dissolved in N/2 H₂SO₄. The excess of acid is titrated with NaOH N/2 using methyl orange as an indicator. Difference of H₂SO₄ thus is left as combined with Al₂O₃ and Fe₂O₃. After addition of concd. H₂SO₄ and reducing with H₂S the Fe₂O₃ is gotten with N/2 KMnO₄. By calcn. the acid combined with Fe₂O₃ is obtained and Al₂O₃ is derived in like manner.

S. S. C.

The ternary system of Al, Zn, Sn. LOSANA AND COROZZI. *Gazz. chim. ital.*, 53 [8], 546 (1923).—The binary system of Al-Sn, Al-Zn, Zn-Sn were investgd. and curves given showing eutectic points. Al-Sn is of simple type with a eutectic at 0.6% Al and 229°C. Sn-Zn system had eutectic at 197°C and 9.7% Sn with 0.5% α -Zn and up in solid soln. while at 49% Zn a conversion of Zn takes place. The Al-Zn system is complicated with solid solns. of the various forms of Al and Zn. The ternary system

has a eutectic at Al 1.46%, Zn 10.37%, Sn 88.17%, and 194°C. Diagram of system given and microphotographs of eutectic. S. S. C.

The ternary system of S, Se, Te. LOSANA. *Gazz. Chim. Ital.*, **53** [6], 396(1923).—Binary system of S-Se, Se-Te, S-Te were run. A eutectic of S-Se at 66% S and 104°C was found. Se-Te did not give a point and S-Te gave one at 109°C. 7% Te with a solid soln. present. No eutectic was formed in the ternary system. A diagram of system and microphotographs are given. S. S. C.

The ternary system of Al, Zn, Sn. E. CREPAZ. *Giorn. Chim. Ind. ed Appl.*, **5** [6], 285(1923).—A study of the ternary system of Al-Sn-Zn was made and a confirmation of the results obtained by other men. Eutectic of Al-Sn, Al-Zn, Zn-Sn systems were found. A eutectic of the ternary system found at 86Sn, 13Zn, 1Al and 210°C. Microphotographs of various points in the study are shown and tables of compns. of the system run are given with curves of binary and ternary systems. S. S. C.

The influence of some compounds on the transformation of quartz. PARRAVANO AND TURCO. *Gazz. Chim. Ital.*, **53** [4], 249(1923).—A rev. of work on increase of transformation of quartz by certain subs. is made. Expts. on ganister rock are made by the addition of various amts. of Fe_2O_3 , P_2O_5 , B_2O_3 , CaO , WO_3 up to 1.5% and the samples burned to cone 15 and 18. The d. of all obtained and results are given showing in nearly all some effect. It was found that 3% of Fe_2O_3 did not greatly affect the refractoriness. B_2O_3 hastens the reaction. Microphotographs of the various mixts. and temp. show the amt. of conversion. Fe_2O_3 forms compd. with the SiO_2 and Al_2O_3 . At cone 18 all the quartzite is converted to trydimite and cristobalite, with the trydimite being bonded by the cristobalite. S. S. C.

Effect of size and physical properties on the heat absorption of checkerbrick. O. A. HOUGEN AND DAVID H. EDWARDS. *Chem. and Met. Eng.*, **29**, 800-3(1923).—The transfer of ht. from the surface of the brick to its interior is computed by the aid of an equation taken from the mathematical theory of ht. conduction, connecting the heat flowing through 1 sq. cm. of surface in a given time, the thickness, thermal condy., sp. ht., apparent density, and temp. of surface. This applies to the case of parallel walls held at a constant temp. (Lord Kelvin's "infinite slab"), but, by means of Langmuir's shape factor, may be applied to the case of checkerbrick. Curves are drawn showing rate of absorption of heat by silica brick of varying thickness ($2\frac{1}{2}$ in. to 10 in.), also by various refract. for a thickness of $2\frac{1}{2}$ in. Tables are computed showing time required by the different mats. to absorb 95% of the total heat, and the max. period of regenerative reversal. It appears that magnesite would make the most desirable checkerwork, were it not ruled out by its tendency to spall, as it absorbs 50% more heat than fire brick, and its reversing time (7 min.) is $\frac{1}{3}$ that of fire brick (21 min.). Carborundum ranks next, but when the reversal time is longer than 20 min., it offers no advantage over fire brick. Since the function of checkerwork is to store up a large amt. of ht. quickly, it is obvious that high thermal condy., d. and sp. ht. are all desirable qualifications, whereas materials of the insulating variety such as Sil-O-Cel should be avoided. A. F. G.

Some changes taking place in the low-temperature burning of Stourbridge fire clays. C. E. MOORE. *Trans. Ceram. Soc.*, **22** [2], 138(1922-23).—Three definite "critical ranges" are to be found in Stourbridge fire clay at temps. approximating to 700°C, 920°C, and 1030°C. The changes take place in all the clays of the series and at similar temps. in each. The magnitude of the changes and particularly of the 700°C and 900°C changes decreases with the alumina content. The examination of the changes in properties at these temps. gives results inexplicable by the kaolinite theory. The hexite-pentite theory provides a "clay substance" agreeing well with analytical results and with the geology of the deposits. The transformation of this "clay substance"

to an isomeric form gives a complete explanation of the changes in properties at 720°C and the critical ranges surrounding it. The polymerization of the isomer completely explains the 920°C change with the exception of the porosity results. The 1030°C change is probably of a purely mechanical nature and requires investigation. The hexite-pentite theory gives a more complete explanation of the processes involved than any other, and is to be regarded as the most successful theory of "clay substance" in its application to Stourbridge fire clay. H. F. S.

Measurement of the indices of refraction of a solid by immersion in a liquid heated to a determined temperature. P. GAUBERT. *Bull. soc. franc. mineral.*, **45**, 89-94 (1922).—The Becke or Schröder van der Kolk method for the petrographical microscope is used. The solid whose n is to be detd. is placed in a hot liquid of slightly lower n . As the liquid cools its n becomes greater and finally equals that of the solid. By noting the temp. at which this occurs an exact detn. of n may be made. There is a list of suitable media, with their n at room temp., and the value dn/dt from which n at any temp. up to the b. p. may be calcd. E. F. H. (C. A.)

Cohesion, hardness and toughness. P. LUDWIK. *Z. Metallkunde*, **14**, 101-10 (1922); *J. Inst. Metals*, **28**, 572. H. G. (C. A.)

The quantity and composition of colloid clay in kaolin from Meissen. ALBERT VASEL. *Kolloid.-Z.*, **33**, 178-80 (1923).—The Meissner kaolin contained at least 3% of colloid clay whose compn. corresponded to the theoretical formula $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. Lime and magnesia did not enter into the compn. of the clay substance but were adsorbed by the colloid particles. H. M. McL. (C. A.)

The determination of chromium in the presence of organic matter. GEORGE GRASSER. *Z. Leder-Gerberei-Chem.*, **2**, 185-8 (1923).—Several methods for the destruction of org. matter in chrome liquors were tried. It was found that oxidation with either $KClO_3$ or fusion with KNO_3 and subsequent titration with $Na_2S_2O_3$ gave good checks with the gravimetric detn. of Cr. Where $KMnO_4$ was used, variable results were obtained. E. J. K. (C. A.)

A new volumetric method for the determination of nickel. G. SPACU AND R. RIPA. *Bul. soc. stiinte Cluj*, **1**, 325-31 (1922); *Chem. Zentr.*, **1923**, II, 380.—The method is based on the complete pptn. of a sky-blue complex compd. of Ni from aq. soln. by K or NH_4 thiocyanate in the presence of C_6H_5N , thus: $NiX_2 + 4C_6H_5N + 2NH_4CNS \rightarrow [Ni(C_6H_5N)_4](CNS)_2 + 2NH_4X$. An excess of 0.1 N NH_4CNS is added in the presence of C_6H_5N to the neutral or slightly acid Ni soln. and the NH_4CNS not reacting is titrated back with 0.1 N $AgNO_3$, $(NH_4)_2Fe(SO_4)_4$ being used as indicator. 2(CNS) corresponds to 1 Ni. Comparative expts. by electrolysis showed max. deviations of 0.11%. C. C. D. (C. A.)

The crystal structure of strontium selenide. MABEL K. SLATTERY. *Proc. Am. Phys. Soc.*, **1922**; *Phys. Rev.*, **20**, 84 (1923).— $SrSe$ has a simple cubic lattice with $d = 3.10 \text{ \AA}$. The unit cube has a side 3.10 \AA , alternate corners being occupied by Sr and Se atoms. S. K. A. (C. A.)

Crystal structure of vanadium, germanium and graphite. A. W. HULL. *Proc. Am. Phys. Soc.*, **1922**; *Phys. Rev.*, **20**, 113 (1922).—V has a body centered cubic lattice, side 3.04 \AA ; distance between nearest atoms, 2.63 \AA ; ideal d., 5.76. Ge has the same structure as the diamond. The side of the unit cube is 5.63 \AA ; distance between nearest atoms, 1.218 \AA ; d. 5.36. Graphite shows a lattice of the hexagonal close packed type, which is not in agreement with results of Debye. S. K. A. (C. A.)

Simplified determination of arsenic. POUSSIGUES. *Ann. chim. anal. chim. appl.*, **5**, 263-7 (1923).—The method is similar in principal to that recommended by Copaux for the detn. of H_3PO_4 . If a soln. of Na_2MoO_4 in dil. HNO_3 is mixed with pure ether and then treated with H_3AsO_4 , 3 layers of liquid result. The bottom layer consists of

an oily, yellowish liquid contg. As and Mo; the middle layer is an aq. soln. contg. the excess of Na_2MoO_4 and the top layer consists of the excess ether. If the reaction takes place in a centrifuge tube graduated at the bottom, which is narrower than the rest of the tube, the quantity of As can be detd. by the depth of yellow liquid. It is necessary, however, to apply a correction for the soly. of the As compd. in the other 2 liquids. By this method of analysis good results are easily obtained in the analysis of tetra-hedrite, pyrite and similar minerals contg. more than traces of As and no P. In the analysis it is recommended to use 25 cc. of soln. contg. 2.9 to 25 mg. of As, which should be added to a mixt. of 65 cc. Na_2MoO_4 soln. (100 g. MoO_3 suspended in hot water, neutralized with Na_2CO_3 , poured into 700 cc. of 6 N HNO_3 and diluted to 1 l.) and 85 cc. of ether.

W. T. H. (C. A.)

Volumetric method for the determination of magnesium. M. BULLI AND L. FERNANDES. *Ann. chim. applicata*, 12, 44-5(1923).—The pptn. of $\text{Mg}(\text{NH}_4)_2\text{Fe}(\text{CN})_6$ from solns. contg. Mg^{++} and $\text{Fe}(\text{CN})_6^{----}$ in the presence of NH_4 salts is utilized for detg. Mg volumetrically. When cold, pptn. occurs only in concd. solns., but it is complete in hot dil. solns. with excess NH_4 salt and EtOH , though a direct volumetric detn. could not be developed because of the difficulty of reading the end point. Filtration and detn. of the excess $\text{K}_4\text{Fe}(\text{CN})_6$ with KMnO_4 were not successful because of the difficulty of washing the ppt. and the formation of a ppt. of $\text{Mn}(\text{NH}_4)_2\text{Fe}(\text{CN})_6$. *Procedure.* To the Mg soln. add an excess of $\text{K}_4\text{Fe}(\text{CN})_6$ and of solid NH_4Cl , heat at 100° for 5-10 min., add approx. 0.05 vol. of EtOH and while hot titrate the excess $\text{K}_4\text{Fe}(\text{CN})_6$ with 0.1 N ZnSO_4 . The end point is reached when a drop of the supernatant liquid is not colored rose by a U salt. A drop of 0.1 N ZnSO_4 is sufficient in the titration to transform the rose color to a clear green and the point is sharper than that in the titration of Zn by the method of Galetti. Calc. the Mg from the reactions: $\text{MgSO}_4 + \text{K}_4\text{Fe}(\text{CN})_6 + 2\text{NH}_4\text{Cl} \longrightarrow (\text{NH}_4)_2\text{MgFe}(\text{CN})_6 + 2\text{KCl} + \text{K}_2\text{SO}_4$; $\text{ZnSO}_4 + \text{K}_4\text{Fe}(\text{CN})_6 + 2\text{NH}_4\text{Cl} \longrightarrow (\text{NH}_4)_2\text{ZnFe}(\text{CN})_6 + 2\text{KCl} + \text{K}_2\text{SO}_4$.

C. C. D. (C. A.)

The practical application of flue gas analysis. C. F. WADE. *Fuel*, 2, 202-3 (1923).—Of the 3 methods for detg. CO_2 , (1) the intermittent "snap" test, (2) analysis of an av. sample over a period and (3) the continuous automatic record, the value of (2) is questioned, since no data are obtained on the cause of a low % CO_2 or as to whether conditions of firing are uniform or variable. (1) is useful in locating the cause of a low % CO_2 indicated by the automatic recorder, for by test holes at successive passes, an air leakage can be located. (3) should be used for detg. the efficiency of combustion, the presence of excess air and the % CO_2 per unit wt. of fuel consumed, rather than the % CO_2 in the waste gases. Flue gas anal., which has been neglected in regenerative processes, reveals serious losses and great variations in the compn. of chimney gases.

C. C. D. (C. A.)

PATENT

Process for refining tin and antimony. GEORGES BONNARD. U. S. 1,475,422, Nov. 27. The herein described process of refining tin and antimony which comprises subjecting crude tin to the action of dry chlorine, separating the liquid chlorides thus obtained from the solid and semi-solid materials, adding water to said liquid mixtures to produce a solution of stannic chloride and decompose the chlorides of antimony, arsenic and sulphur, separating out the solution of stannic chloride, and electrolytically obtaining tin from such solution.

General

Technical education in relation to the refractories industry. G. W. HEFFORD. *Trans. Ceram. Soc.*, 22 [2], 205(1922-23).—There are undoubtedly numbers of first-

rate men in the industry, so far as their experience goes really first-rate, but for lack of suitable scien. training they are unable to translate the results of research into works practice. The function of research work in connection with industry is something more than the provision of foolproof tips; it is to det. principles and constants, which, by men with training, acumen and imagination can be applied in the circumstances of the particular works in which they are interested. An interesting attempt has just been started at Brierley Hill to provide suitable instruction in refracs.; its success will be detd. largely by the amt. of practical support it receives from the indus., and the amt. of practical sympathy the industry extends to the students.

H. F. S.

Prepared non-metallics in Canada. S. J. COOK. *Can. Chem. & Met.*, **7** [9], 226-31(1923).—Includes figures of consumption of many ceram. mats. in Canada during 1922, also a few notes on the production of ceram. products.

B. M. L.

Dressing crude chalk by modern methods. A. B. PARSONS. *Eng. & Min. Jour. Press*, **116** [10], 415-20(1923).—In its whiting dept., the Benjamin Moore Co., at Carteret, N. J., has cut its costs nearly 50% by re-equipping an old plant with modern mach. Crude French chalk is dressed to remove 8% sand and 20% moisture and the product ground to -300 mesh. A flow sheet and pictures and drawings of mach. in the new plant are given in the article. A grab bucket crane for large unloading, modern conveyor mach., Dorr classifiers and a vacuum filter have reduced the labor force from 38 to 9 workmen of the same ability. Much of this equipment is applicable to the dressing of feldspar, kaolin, silica, etc.

B. M. L.

Melting in electric furnace. J. L. CAWTHON, JR. *Foundry*, **51** [23], 938(1923).—A description of current practice in the production of synthetic cast iron in both acid and basic elec. fur. Typical charges, when melted down contain about 2.50% C. To secure a carbon content over 2.75% it is necessary to have a clean bath of superheated metal, agitated vigorously. The silicon content is adjusted by the addn. of 50% ferro-silicon, and manganese is added as ferro-manganese. A rapid method of testing the metal before pouring is given, together with a chart for calcg. mixts.

M. E. M.

Describes cupola reactions. J. COLL. *Foundry*, **51** [23], 961(1923).—A review of present day theories concerning reactions within a cupola, with some conclusions by the author.

M. E. M.

The dusted lung with special reference to the inhalation of silica dust and its relation to pulmonary tuberculosis. B. S. NICHOLSON. *J. Ind. Hyg.*, **5**, 220-42(1923).

E. J. C. (C. A.)

The partial decomposition of certain solid substances effected by grinding. JOHN JOHNSTON. *Rec. trav. chim.*, **42**, 850-4(1923).—The process of grinding a solid may be accompanied by certain changes in the compn. of the mat. In particular it may cause a solid substance, which on dissociating yields a gaseous product, to lose some part of this volatile component. From theoretical considerations it appears that this partial loss of volatile component may occur more generally than has hitherto been supposed; and expt. has confirmed this deduction. In many cases the loss will be unappreciable because the dissoc. pressure is too small or the rate of dissoc. too small, or because the substance is not hard and crushes easily. In other cases like the hydrates the loss may be so large as seriously to affect analytical results.

E. J. W. (C. A.)

Producer gas and gas-producer practice. III. R. V. WHEELER. *Fuel*, **2**, 182-6, 219-21(1923); cf. *C. A.*, **17**, 203, 3088.—Producer construction, grates, solid-bottom, bar-bottom and H_2O -bottom producers, the body of the producer, the charging hopper; the method of providing the blast and the use of superheated blasts are described with diagrams.

C. C. D. (C. A.)

CERAMIC ABSTRACTS

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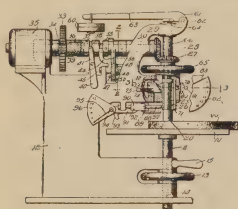
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Abrasives

Abrasives. ANON. *Mineral Ind.*, **31**, 1-7(1922).—A review of the abrasives industry. A. B. (C. A.)

PATENTS

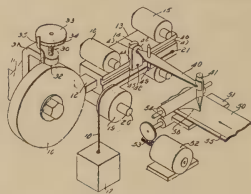
Method of and apparatus for grading. CHARLES J. HUDSON and WILSON C. BROGA. U. S. 1,478,335, Dec. 18.—The method of grading an article of bonded abrasive grains which comprises relatively moving a wearable tool



and said article in contact through an extensive circular path and thereby abrading the tool by the action of successive abrasive grains, simultaneously feeding the tool forward under a definite press., continuing said relative movement for a definite period and until a measurable reduction in tool size has been produced, and measg. the combined amts. of wear upon the article and the tool produced by such abrasion.

Process and apparatus for classifying grinding wheels.

CHARLES E. GILLET. U. S. 1,478,333, Dec. 18. The method of classifying a grinding wheel comprising the steps of rotating the wheel at a normal grinding velocity, grinding a standard wearable tool thereby under uniform press. and for a definite period, making successive determinations of the grinding effect of the wheel on the tool as the opern. proceeds, measg. the wheel wear produced in the time interval, and from the grinding characteristics thus observed classifying the wheel by comparison with data obtained with standard wheels



Art

Color measurement by the Ostwald method. ISMAR GINSBERG. *Textile World*, **64**, 1519-21, 1539(1923); cf. *C. A.*, **17**, 2384.—The practical application of the Ostwald theory to color analysis and the detn. of color purity are discussed. The convenience of the method in designating colors and defining fastness is pointed out. A description of the app. is given. C. E. M. (C. A.)

Cement, Lime and Plaster

Continuous automatic shaft kiln for cement plants. F. DEM. TUBMAN. *Rock Products*, **26** [25], 20(1923).—Successful European practice is described, largely the Buhler system. Fuel, coke breeze or anthracite of pea size, and raw mat. are weighed, mixed, moistened with the detd. amt. of water, and briquetted. The briquettes push each other over a bridge to a movable feeding and distributing device. The kilns range to 9 ft. internal diam. with walls of ordinary mat. to 26 ft. in height. Forced draft of approx. 200 mm. water is used, and an output of 45 tons per 24 hrs. with the 9 ft. kiln is obtained. Discharge is secured at the bottom of the shaft by means of a

ribbed cone, toothed rolls, or preferably by a Buhler toothed rasp or ram moving horizontally, and actuated hydraulically giving an even discharge. The clinker is then removed through air locks, and conveyed to storage. Fuel econ., low power consumption in opern., less and easier repairing of kiln, flexibility of opern., ability to stop kiln for any period to 24 hrs., space econ., better and quicker pulverizing of clinker, and excellent quality cement requiring low gypsum content are advantages claimed for product over that of rotary kiln. C. R.

Lime-kiln thermal efficiency. V. J. AZBE. *Rock Products*, 26 [16], 35(1923).—The percentages of CO_2 , O_2 , and CO in the waste gases, together with the temperature of the gas, and a knowledge of the fuel used are made the basis for the calcs. The tons of lime per ton of coal, and the thermal efficiency of the kiln are calcd. in the usual manner. The greatest ht. loss is due to escape of waste gases at a high temp. either incompletely burned, or with a large amt. of excess air, and can be more readily controlled than losses due to radiation, ht. in burned lime, moisture, etc. Excess O_2 over 2% means that the excess air carries off sensible ht., overloads the gas carrying capacity of the kiln, reduces the kiln temp. and ht. transfer, and reduces the output. In opern. of lime kiln a better proportioning of air and fuel, more regularity, more uniformly sized rock, and better charging are needed. Graphs are furnished for tons of lime per ton of coal, thermal efficiency, fuel loss due to escape of waste products (dry), withdrawal of hot lime, and incomplete combustion, and loss of lime due to too great amt. of excess air. C. R.

The spontaneous disintegration of cement clinker on cooling in the air. J. DAUTREBANDE. *Le Ciment*, 28, 355–60(1923).—It is maintained that the disintegrating of cement clinker in air is due to the formation of bicalcium silicate ($2\text{CaO}.\text{SiO}_2$), and that this compd. may be formed not only as the result of an excess of silica for the formation of tricalcium silicate ($3\text{CaO}.\text{SiO}_2$), but also from insufficient burning, and from overburning of the charge. The causes for disintegration may be subdivided as follows: (A) **Clinker partially reduced to powder.**—(1) Silica content of the fine powder much higher than that in the lump clinker. (Analyses I.) This may result (a) from segrega-

| | I | | III | II | |
|--|-----------------|--------|--------|-----------------|--------|
| | Lump clinker | Powder | | Lump clinker | Powder |
| SiO_2 | 25.10% | 29.16% | 28.38% | 22.45% | 24.00% |
| Al_2O_3 } Fe_2O_3 } | 12.20 | 13.70 | 16.55 | 9.25 | 9.75 |
| CaO | 61.10 | 56.20 | 54.74 | 65.00 | 63.00 |
| MgO | 0.20 | 0.18 | .. | 1.70 | 1.44 |
| SO_3 | 0.24 | 0.21 | 0.27 | 0.51 | 2.12 |
| Ign. loss | 0.45 | 0.38 | 0.28 | 0.60 | 0.80 |
| | 99.29 | 99.83 | 100.22 | 99.51 | 99.11 |

tion of the silica due to poor mixing, (b) from an excess of silica in the batch due to poor propng. of the raw mats., (c) from an increase in the silica content of the clinker due to the incorporation of high silica ash from the fuel, and (d) in rare cases from inclusion of silica from the lining of the fur. (2) Excess of silica in powder over silica in the lump clinker, not sufficient to cause disintegration. (Analyses II.) Due to insufficient burning some bicalcium silicate is formed. (B) **Clinker totally reduced to powder.**—(1). Silica content of the batch too high, with the resulting formation of bicalcium silicate. (Analysis III.) (2) The compn. of the cement does not differ from other

known stable cements. The cause in this case was too much free sand in the batch, and insufficient burning to obtain tricalcium silicate. A sufficient quantity of Fe_2O_3 is often necessary to help the fusion. **Tests on Disintegrated clinker.**—If instead of allowing the clinker to cool in the air where it would disintegrate, it is thrown into cold water, the clinker remains intact. On drying and grinding the clinker, a cement is produced which when tempered with water has hydraulic properties. This would seem to indicate that there are two allotropic forms of the bicalcium silicate. The powder of bicalcium silicate resulting from the overburning of clinker has a grey-blue color, and a sp. gr. of 3.14 to 3.18. On adding the powder to cements and mortars, the increase in powder content from 10 to 50% (a) required increasing amts. of water for tempering the mixts., (b) delayed the time of initial and final set, and (c) decreased the crushing strength appreciably at each addition of powder. Cf. *Jour. Amer. Ceram. Soc.*, **4** [10], 874(1921).

L. N.

White brick made from blast furnace slag. AUGUSTE LIEVIN. *Rev. Mat. Constr. Trav. Pub.*, **170**, 241-3(1923).—Slag from blast furnaces is run into water, where it breaks up into granular pieces. 30% of lime is added to the dried slag and the mixture pulverized in a tube ball mill. The resulting mass is then mixed with 10% lime and sufficient water to moisten it. The body is pressed into brick in a brick machine, with a capacity of 1000 brick per hour. After hardening for three months, the brick are ready for use. Six photographs are given of the plant at Pont-à-Mousson (France), where the slag is utilized for brick-making.

L. N.

The setting of plaster. JOLIBOIS AND CHASSEVANT. *Comptes Rendus*, **177** [2], 113-116(1923).—At a temp. of 30° CaSO_4 calcined at 300° and below gives a supersatd. soln. of 7.3 g. per l. of anhyd. CaSO_4 . The dihydrated CaSO_4 gives a satd. soln. of 2.1 g. per l. at 30° . The soln. reaches its limit of supersatn. in approx. 10 min. When calcined above 300° the max. soly. of CaSO_4 becomes a function of the temp. at which it was calcined. The setting of anhyd. CaSO_4 proceeds in 3 steps. (1) Formation of solid hemihydrate $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. (2) Soln. of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. (3) Crystn. of gypsum. Cf. *Ceram. Abs.*, **2** [10], 214(1923).

W. R. K.

Potash and waste heat recovery from cement kilns. ANON. *Chem. Age*, **9**, 442(1923).—Announcement has been made of a new method of effecting recovery of potash from dust of cement kilns (an English invention), which new process presents possibilities in the way of utilizing waste heat for steam-raising purposes. Expts. with this system have shown that with certain grades of raw mat, some of the dust from the kilns will collect in caked form on hot surfaces, and that this caked mat. contains potash salts and other ingredients which make it valuable; this caking mat. may be sold at a much higher price than the finished cement. The part of the dust adhering or caking to the hot surfaces has a different chem. compn. from the rest of the dust which will not so adhere, making possible the recovery of the valuable by-product. This caked mat. is removed from the walls by means of scrapers; from the primary collecting flue hot gases are led through a ht. absorbing device in the shape of a waste-ht. boiler. Here a considerable reduction in temp. of the gases is effected; their vol. and velocity are likewise reduced and separation of the remainder of the dust is facilitated. The inventor states that because of the cooling of the gases in this way the dry dust separators beyond the boiler have gases of less velocity to handle; moreover the washers through which the gases subsequently pass, operate much more satisfactorily on the cooled gases, as very hot gases tend to evap. and carry away the spray water in the form of steam, and interfere with the satisfactory opern. of the washer generally. Also the cooled gases are much more readily handled by the fan. In cases where the final removal of the dust is effected by elec. means, the reduction in temp. of the gases is of great advantage.

O. P. R. O.

Dehydrating gypsum by steam under pressure. F. B. STUART AND C. A. RIVERO. *Chem. Age* (N. Y.), **31**, 476(1923).—The common practice has been to break up the rock gypsum and then ht. the fragments by means of an open fire to drive out the moist. This has been both wasteful and expensive. F. B. Stuart and C. A. Rivers of El Paso, Texas, have demonstrated that gypsum can be dehydrated by steam as shown in U. S. Pat. No. 1,463,913. By this method the rock gypsum is loaded into steel cars which are run into cylinders of 6 ft. diam. After bolting on the cylinder heads, steam is admitted to 150 lbs. pressure, where it is maintained for about 4 hrs., depending largely on the physical structure of the gypsum. At the expiration of this period the steam is shut off and after the pressure within the cylinder has been considerably reduced, the balance of the steam is blown off. Upon the removal of the car from the cylinder it will be found that the gypsum has been uniformly dehydrated. It is now ready to be crushed and pulverized. The material in this form is commercially known as plaster of Paris and is mixed with other substances in the manuf. of numerous forms of building material in which gypsum is a primary constituent. O. P. R. O.

A study of lime kilns. A. E. TRUEDELL. *Rock Products*, **26**, 9-15(1923); cf. *Ceram. Abs.*, **1** [9], 242(1922).—In a progressive series of articles, kilns, principles of combustion, dissociation of limestone, htg. chambers and fur., efficiency and econ. of kilns, control of kilns are discussed, and a general summary is made at end. In proper combustion amt. of excess air, draft, ht. losses, and manner of htg. must be considered. Cryst. stones which disintegrate under slight shocks while htg. must be burned in some manner which disturbs the stone less *e. g.*, in a pot kiln, or where motion can be controlled as in rotary kiln. Since lime is a poorer ht. conductor than stone, the smaller the lumps the less ht. required to dissociate entire lump, and the quicker it will take place. Approx. 1250°C is used for burning high Ca lime. The introduction of steam by various means assists the dissociation. The size and shape of htg. chamber should conform to best practice for the particular stone. Vertical kilns cannot burn soft or small stone. Hoffman or ring kilns will burn soft stone. Rotary kilns due to control burn various types including soft and small sized mat. All fuels are used, but a high calorific value fuel is not needed since temp. is not high. Radiation, poor combustion, excess air, too much draft, improper design of fur., lack of attention to charac. of different fuels are causes of ht. losses and trouble. The fixed charges for opern. of a lime plant must also be considered before deciding on equipment to be used as this has an appreciable effect on cost of burned product. Advantages and disadvantages of pot kiln, mixed feed kiln, vertical kiln, Hoffman or ring kiln, tunnel and rotary kiln are listed and briefly discussed. In any case local conditions as regards stone, fuel, power supply and market will also govern selection of kiln. C. R.

Plaster from limestone dust. C. F. WILLARD. *Rock Products*, **26**, No. 13, 39-42 (1923).—By reducing limestone to a colloidal state it is possible to make a hard plaster and thus eliminate the cycle of limeburning, hydrating and hardening. Incorporated solid colors are unaffected and plaster is waterproof. Walls thus finished can be polished with an agate burnisher and a surface like marble produced. It adheres to rough boards and can be used as a stucco material. Patents are applied for. H. C. P. (C. A.)

The influence of temperature on the disintegration of Portland cements due to the presence of gypsum. H. KÜHL AND H. ALBERT. *Zement*, **12**, 201-3, 210-13(1923).—Port. cements were mixed with 2, 10 and 20% gypsum. Test specimens were made of each. These were stored at temps. varying from 0° to 100°. The specimens with 2% gypsum showed some disintegration at the end of 28 days. Those with 10% gypsum disintegrated at the end of 14 days and those with 20% gypsum at the end of 7 days. The greatest disintegration occurred at 20-40°. At 100°, no disintegration occurred in any of the specimens. R. F. S. (C. A.)

Enamel

Records early stove industry. E. C. KREUTZBERG. *Foundry*, **51** [24], 973-80 (1923).—An historical acct. of stove manuf. in the U. S. in colonial days, with many photographs. M. E. M.

Tells of pearlitic cast iron. CARL SIPP. *Foundry*, **51** [24], 986-7 (1923).—Pearlitic cast iron is a recent development in Germany. The author claims a high degree of flexibility, increased resist. to shock, high combined carbon without a high brinnell hardness, and great stability of structure at high temp. No details are given of the process of manuf., which is patented. M. E. M.

Glass

Natural sillimanite as a glass refractory material. S. ENGLISH. *Jour. Soc. Glass Tech.*, **7** [27], 248 (1923).—An investigation as to the suitability of natural sillimanite as a glass making refrac. The foll. tests were carried out: Detn. of a suitable working mixture; meas. of the drying and firing contractions; detn. of the porosity after firing; meas. of the amt. of the corrosion by soda-lime and potash lead-oxide glasses; meas. of the reversible thermal expansion. For purposes of comparison similar meas. under identical conditions were made on a standard pot clay mixt. Natural sillimanite can be satisfactorily bonded so as to form slabs and small crucibles by the use of a comparatively small portion (9%) of ball clay. On drying this mixt. of sillimanite and clay shows a very small shrinkage and on burning to 1400° it has a negligibly small further contraction. The porosity of the fired sillimanite mixt. is rather less than that of a standard pot clay mixt. Sillimanite crucibles suffer very much less than do clay crucibles from the attack of glass at high temps. Up to 800° the coeff. of expansion of the sillimanite mixt. after burning at 1400° is quite regular and has a value very close to the mean coeff. of expansion of a hard burned standard clay mixt. Natural sillimanite should serve as an excellent basis for glass-making refrac., chiefly on account of its high m. p., its very low drying and firing shrinkages and its marked resistance to corrosion by molten glass. J. G. P.

The corrosion of fire clay by alkali-lead oxide glasses. EDITH M. FIRTH, DONALD TURNER AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **7** [27], 218 (1923).—Expts. were made in small exptl. pots on the corrosive action of soda and potash-lead oxide batches on different fire clays at a temp. of 1350°, the amt. of corrosion being measd. by the amt. of alumina and iron oxide abstracted from the fire clay during the melting process. The results showed that: Different fire clays resist the action of melted batch to different extents. High alumina content alone does not bestow resistance to corrosion on a fire clay nor alone does low porosity. Of 4 clays tested the least corroded and the most corroded both had a high alumina content and low porosity. Potash glasses are not less corrosive than soda glasses of equivalent alkali content. In our expts. they were found to be somewhat more corrosive. The corrosion of fire clay refrac. mats. occurs most actively during the melting opern. the attack by the glass itself being very much slower than that due to the batch constituents, especially the alkali salts. It was proved that maintaining a pot at a temp. of 1350° for a period prior to charging in batch increased its resistance materially to attack. Firing for 24 hrs. gave much better results than 3 hrs. Spraying the interior of the pot with a little soda ash and htg. it for 3 hrs. at 1350° was not found to possess any advantage in diminishing corrosion. Thorough batch mixing and rapid melting should conduce to diminish the corrosion of fire clay glass batches. J. G. P.

Some observations on the corrosion of fire clay materials by alkali salts. DONALD TURNER AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **7** [27], 207 (1923).—Mixts.

of well burnt fire clay grog with a particular alkali salt were htd. together in a crucible of non-corrodible mat., and detns. of the corrosive action were made. Methods given. Sodium carbonate, potassium carbonate, sodium nitrate, potassium nitrate and borax all attack well-burnt fire clay extensively even at as low a temp. as 800°. The nitrates are more corrosive than the carbonates, and the potassium salts more active than the sodium salts. Sodium sulphate at 800° has only a very slight action on burnt clay as compared with the carbonate and nitrate. Rise of temp. between 800° and 900° causes a rapid increase in the rate of corrosion due to carbonates and nitrates. Different clays, fired at the same temp., exercise different degrees of resistance to corrosion by alkali salts. The resistance is not dependent directly on the chem. compn. One aluminous clay was most attacked while a second was least attacked of 4 clays tested. The corrosion probably depends on the density of the clay body. Fire clay burnt at 1400° is more resistant to corrosion than when burnt only at 1300°. J. G. P.

The effect of saltcake in soda-lime batches in corroding fire clay refractory materials. EDITH M. FIRTH, F. W. HODKIN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 7 [27], (1923).—A series of glass batches was prepd. in which the soda ash was gradually replaced by its equivalent of salt cake and from them glasses were melted. Meltings were made in small crucibles and were made in triplicate, the 3 pots being set in the same fur. so as to insure, as far as possible, similarity of fur. conditions. Melts were made to definite temps. and for definite time intervals and an analysis of each sample of glass was made to det. from the increase in the amt. of alumina and iron oxide the extensiveness of corrosion. Results are given and a discussion. J. G. P.

Ionization in glass. Ionization by collision in glass at high field strength. A. GUNTHER-SCHULZE. *Physik. Z.*, 24, 212-3(1923).—The sp. condy. of glass at high elec. field strength can be compared to the same phenomenon in gases. $\log \alpha = abX$, α being the measd. condy. and X , the field strength. W. M. C.

Notes on the Ashley bottle machine. S. ENGLISH. *Pottery Gaz.*, 48, 1299(1923).—History of development of Ashley bottle machine. J. W. H.

The effect of titania on the properties of glasses. W. E. S. TURNER AND A. R. SHEEN. *Pottery Gaz.*, 48, 1804-8(1923).—Titania renders annealing of glasses easier and hinders the devitrification. If titania glasses are ht.-resisting as all available literature indicates, this property is not due to a low thermal expansion, hence further tests are necessary to det. accurately why titania glasses are ht. resisting. J. W. H.

Italian laboratory glass industry. ANON. *Chem. Trade Jour. & Chem. Eng.*, 73, 459(1923).—The war is responsible for the lab. glass indus. in Italy, which has grown to such propns. that it now supplies the home market completely and also exports neutral glass tubes to Spain, France and Belgium. The quality of the products has secured a reputation even in competition with the world famous products of Jena. O. P. R. O.

Automatic manufacture of glass bottles. ALEXANDER FERGUSON. *Chem. Trade Jour. & Chem. Eng.*, 73, 393(1923).—F. gives a description of the new automatic mach. for mass production of glass bottles, for which he has prepd. designs. It is called the cyclone fur., and it is said that it allows 540 T. of glass to be made in 168 hrs. per week, or 120 bottles per min. Ordinary tanks usually require 100 T. of coal to 100 T. of glass, while it is possible, with the cyclone fur., to use only 30% coal to glass, with a safety margin of 13½ T. in each 100 T. glass in a fur. occupying 600 sq. ft. instead of the present 8800 sq. ft., and yet leaving the ground area clear for any other purpose. It is claimed to be also entirely automatic, requiring no skilled labor after the chemist has settled the batches for the glass required. The principal feature of the fur. is that the burners are so set as to give a whirling motion to the gases, which travel about 175 ft. per sec. The walls of the fur. are inclined from top to bottom and the batch mat. is ground to a mesh of about 60. Into these whirling gases the batch mat. is fed, and the description

of the opern. is that the molecules of glass, once formed, are cast forth from the whirling gases and coalesce into a liquid homogeneous paste and flow down the walls of the fur. like glucose under the influence of radiant heat. The glass passes on to the forehearth, from which it is gathered and delivered to the bottle-forming plant. The next portion of the app. is that in which the molten glass is sucked up automatically and transferred to the molds, which are mounted on the periphery of a large wheel. These rotating gatherers are so arranged as to suck up the desired quantity for the particular size bottle. The cyclone machines occupy only $\frac{1}{8}$ the area of the Owen's gatherer with 3 times the capacity, although the times in the molds are identical. The total outlay on the machine and on operation is much less than in ordinary practice. So far it is just in the exptl. stage, but the demonstration given has been satisfactory. O. P. R. O.

Glass manufacture. ANON. *S. African Jour. Indus.*, **6**, 146(1923).—Glass manuf. on larger scale is needed for the Union of S. A. At the present time the Union is importing glass bottles and jars at the rate of some £115,000 per annum. Inquiries into the raw mats. have, so far, left no doubt that everything requisite for the making of, at least, common glass suitable for bottles and jars for commercial purposes is obtainable in S. A., and it is believed by competent judges that the whole of this oversea expenditure could be avoided by local glass manuf., and further that a surplus could be provided for an export trade. O. P. R. O.

The geology of glass sands. H. E. ELKINGTON. *Rock Products*, **26** [19], 28 (1923).—The origin of the 4 large glass sand producing regions of the U. S. are discussed briefly. N. J. sand is a refuse sand, with rounded grains, and usually contaminated with ilmanite, rutile, brookite. Pa. sand of the Oriskany region has been consolidated on deposition by ht. and press. and a sandstone of great firmness has been formed. The grains are sharp, and free from the contaminating subs. of the Jersey sands. Ill. glass sand is rounded, and of great purity, being laid down in St. Peter's period of the Ordovician age, and then sorted afterwards by wind and water. The Mo. deposits are similar to the Ill. deposits though smaller. C. R.

Initial heat leers. W. S. MAYERS. *Glass Ind.*, **4**, 163-6(1923).—In the initial heat leer the ware is introduced immediately after being pressed while still luminously hot, and becomes uniformly heated by internal conduction. Very little outside ht. is necessary as only the pans of the leer need be heated. The ware passes through a tunnel heavily insulated against heat loss, and cools gradually as usual. These leers require only about $\frac{1}{8}$ the pan area required by an ordinary leer of the same production. See *Ceram. Abs.*, **2** [5], 96(1923). D. E. S.

Electrification of the Allegheny Plate Glass Company. G. P. WILSON. *Glass Ind.*, **4**, 127-9, 152-3, 169-72(1923); (Reprinted from *Elec. Jour.*, **20**, April(1923)).—This article is a description of the process of making plate glass at Glassmere, and is illud. with cuts of elec. controls, layout diagrams, etc. The whole plant is operated by elec. power. D. E. S.

Furnace and combustion calculations. H. S. BRADY. *Glass Ind.*, **4**, 148-52 (1923).—Calculations are given of draft pressure, ht. regeneration, theoretical flame temp. and air required for complete combustion. D. E. S.

Tensile strength of glass. J. T. LITTLETON. *Phys. Rev.* (1923).—Lack of uniformity and reliability in the results hitherto obtained is due to the fact that the strength of the surface is greatly reduced by slight scratches. *The new method of measurement* here described, attempts to eliminate as far as possible the effect of surface defects. A bar of glass is used which has been cut from the middle of a slab which had been heat treated in such a way as to leave the upper and lower surfaces of the bar under high compression, while the inside is under tension. When this bar is broken by bending, the tension introduced in the lower surface is largely neutralized by the initial compres-

sion, so that the maximum tension is not in the lower surface but in a zone nearer the neutral axis. The initial stresses are measured by means of polarized sodium light and a calibrated Babinet compensator, and these combined graphically with the stress due to the central load required to break the bar, give the maximum tension introduced which is taken as the lower limit to the strength of the glass. In this way values of 12 and 15 kg./mm.² were obtained for a lead glass and a borosilicate glass, values twice as great as those given by the usual methods; and the mean deviation of individual measurements is less than half as great.

J. T. L., JR.

The wetting of glasses by mercury. EARLE E. SCHUMACHER. *Jour. Amer. Chem. Soc.*, **45**, 2255-61(1923).—Hg was placed in containers whose walls were as free as possible from adsorbed gas. Wetting was generally obtained on containers of quartz but only occasionally on pyrex or soda-lime glass. The difficulty of removing adsorbed gas increases with the alk. content of the glass and the tendency toward wetting with Hg decreases. This latter may be due to the adsorbed gas or to formation of a surface film of NaOH and amorph. SiO₂.

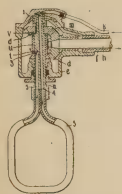
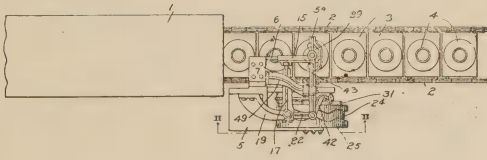
D. F. S.

Polishing glass with acid. O. PARKERT. *Diamant*, **45**, 165, 177(1923); cf. *Ceram. Abs.*, **2** [6], 166(1923).—The ware is first washed in a bath of H₂O 1000, H₂SO₄ 12, and HCl 1. It is then dipped for about 45 sec. in a soln. of H₂O 1, H₂SO₄ 2, and HF 1, preferably kept at a temp. of 40-50°.

J. B. P. (C. A.)

PATENTS

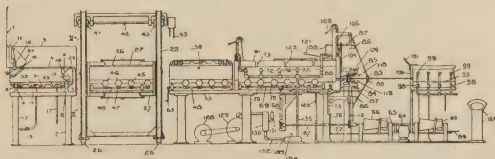
Glassworking machine. THEODORE H. SLOAN. U. S. 1,478,261, Dec. 18. In a glass-finishing app., the combination of a conveyor for carrying glass articles through a htg. fur., a frame, a tool carrier mounted on the frame for reciprocating movements parallel to the conveyor, a finishing tool mounted for reciprocating movement on said carrier, an article positioner borne by the carrier and movable to and from an article in coördination with the reciprocation of the tool, and connections coördinated with the movement of said conveyor for reciprocating said carrier on the frame and said tool in the carrier.



Means for stirring glass. CHARLES ALGERNON PARSONS. U. S. 1,479,511, Jan. 1. For use in the manuf. of glass, a stirrer with means for giving thereto a rotary motion about its own axis and an orbital movement, substantially as and for the purposes described.

Glass manufacture. ROBERT M. CORL. U. S. 1,478,554, Dec. 25. In combination means for advancing a set mass of glass, means for applying a converting ht. to the forward end portion of the mass to flow

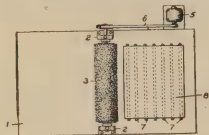
therefrom a sheet of lesser thickness than the mass, means for carrying away the sheet as it flows from the mass, means acted on by the sheet to regulate the htg. means to maintain a substantially uniform flow of glass from the mass, and means for supplying glass to the rear end of the mass to maintain its continuity and the continuity of flow of glass therefrom.



Etching compound. AARON M. HAGEMAN and JULIUS M. KOVACHY. U. S.

1,471,466, Oct. 23. A compound suitable for etching glass having, as its active ingredient, a harmless acid salt.

Process of polishing glass. CHRISTOPHER BROWN. U. S. 1,480,542, Jan. 15.



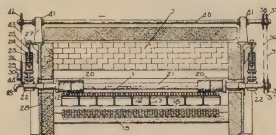
A process of smoothing or polishing a glass sheet which consists in rotating a brush with its axis extending transversely of the sheet and having radially extending fibers with the ends of such fibers in contact with the sheet at a high rate of speed so that the fibers engage the sheet with an impact or whipping action, and supplying an abrading or polishing material to make such action

effective to smooth or polish the glass.

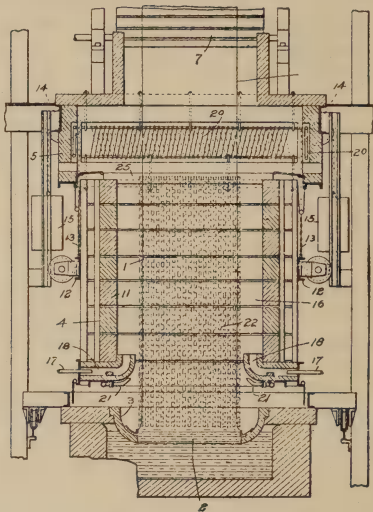
Apparatus for drawing sheet glass. ROBERT A. MILLER. U. S. 1,480,625, Jan. 15.

An app. for drawing sheet glass from a bath of molten glass, means for drawing a sheet upwardly from the bath, temp. equalizing means in the form of a flexible openwork curtain surrounding the sheet and extending upwardly from the bath, a leer casing surrounding the curtain, and means for applying heat to the interior of the casing.

Apparatus for drawing sheet glass. OTTO C. MILLER. U. S. 1,481,218, Jan. 15. In a machine for drawing sheet glass, a source of molten glass, and means for drawing a sheet of glass therefrom, comprising an endless carrier and flattening table for the sheet, means for driving the carrier, a plurality of cross-shafts above the sheet and table, asbestos rollers carried by the shafts engaging the edge portions only of the sheet, means at either end of the shafts



for yieldingly supporting a portion of the weight thereof, means for driving the shafts in unison, and means for internally cooling the shafts and rollers.



Heavy Clay Products

Improvements in drying refractories or other goods. J. HOLLAND AND W. J. GARDNER. *Pottery Gaz.*, 48, 1799-1801(1923).—See *Ceram. Abs.*, 3 [1], 18(1924).

J. W. H.

Up-to-date methods of manufacturing sewer pipe. STAFF ARTICLE. *The Clayworker*, 80, 30-1(1923).—Article deals with the mfg. process of sewer pipe in the following steps: mining, prepn., molding, drying, setting, firing and glazing. J. W. H.

Grinding and screening clays. J. H. KRUSON. *Brick and Clay Rec.*, 63, 691-4 (1923).—Water content and size of clay lump has considerable bearing upon the clay prepn. Experience has shown that weathering and preliminary grinding often improves the product and reduces repair costs. Author gives helpful suggestions on prep. clays and shales, such as proper speed of pan, wt. of mullers, etc. J. W. H.

Essential qualifications of brick pavers. ANON. *Brit. Clayworker*, 32, 195-200 (1923).—The quality of paving brick was investigated by the Brit. Paving Brick Assoc. by means of rattler tests. Tests were made both of the dry brick and upon the wet

brick. In testing granite block in this manner it was found that the wear on the wet block was about four times as great as that on the dry block. In the case of paving brick, however, it was found that the wet brick tested 10% less in one case. In two other cases the wear was increased $12\frac{1}{4}\%$ and $16\frac{1}{2}\%$. This proved the important fact that paving brick may be far superior to granite block when wet. This may explain the fact that brick roads are declared to be cleaner than any others, and why they outlast other paving materials. Contrary to what was expected, a brick which had been made by the semi dry process passed as a No. 1 paver and showed less wear when wet than when dry by 10%. It also wears more uniformly than brick made by the stiff mud or soft mud processes. This brick had an absorption of 2.67%. Structure defects revealed by the rattler tests are as follows: laminations, too granular a condition of the substance, softer condition of the interior of the material than the outside, brittleness, and weakness of the stiff mud brick where the clay escape is situated. These defects were found in brick which stood the test as well as in those which failed, so that these are no safe criterion in ascertaining whether a brick will stand the test or not. It was found that brick when repressed were not improved. The brick lose about as much in the first 450 rev. as they do in the subsequent 1350 rev. as is shown below:

| First 450 rev. | Total of 1800 rev. | Times |
|----------------|--------------------|-------|
| 7.8 | 17.8 | 2.28 |
| 6.6 | 17.9 | 2.71 |
| 10.6 | 26.6 | 2.51 |
| 10.8 | 25.7 | 2.38 |
| 12.0 | 31.8 | 2.65 |
| 12.7 | 33.8 | 2.65 |
| 13.3 | 35.8 | 2.70 |
| 17.5 | 46.1 | 2.63 |

H. G. S.

Bricks from oil-shale. ANON. *S. African Jour. Indus.*, 6, 324(1923).—Extensive deposits of oil-shale are found in Germany but, owing to their small oil-content, their development presents many difficulties. A method has recently been proposed for utilizing these shales to make a cheap building material; the shale is ground and mixed with sand or clay, the proportion depending on the richness of the shale. Bricks of this mat. are shaped and placed in a kiln. where they are baked by the combustion of their own oil. The bricks so obtained contain only small quantities of calcium sulphate and sulphite, and are as hard as ordinary bricks, from which they differ little in appearance.

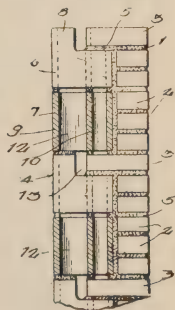
O. P. R. O.

Heat economy in sand-lime brick plants. ANON. *Arch. Wärmewirtschaft*, 4, 96-100(1923).—Details are given of the distribution of the heat used in 2 plants; the fuel consumption could be reduced $\frac{1}{3}$ by proper equipment.

E. W. T. (C. A.)

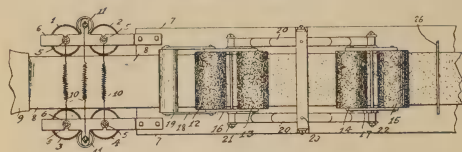
PATENTS

Composite brick and tile wall construction. WILLIAM GUSTAVUS DEMAREST. U. S. 1,479,379, Jan. 1. A composite brick and tile wall construction comprising, in combination with a brick facing having ordinary courses and header courses, a plurality of complementary courses of tile arranged behind each group of ordinary courses comprehended between adjacent header courses, certain of the tile having reduced extensions disposed behind said header courses, the tile and the reduced extensions having continuous vertical openings therein constituting suitable vertical



air passages through the wall and serving to dissipate the moisture finding its way in through the wall.

Process for surfacing clay products. EMMETT V. POSTON. U. S. 1,477,663, Dec.



18. A process of surfacing plastic substances consisting in passing the plastic bar between a series of press. rolls having granular surfaces of varied degree of coarseness, and subsequently severing the substance into building elements.

Refractories

How to make good silica brick. F. E. AYARS. *Brick and Clay Rec.*, **63**, 550 (1923).—A. discusses each step in detail, beginning with the selection of the raw mat. and following it to the final inspection. Hard quartzite coming from either the floe or ledge and containing 97–98% silica produces a strong brick of high refractoriness. Only sufficient raw mat. should be stored at the plant to insure a steady supply; any advantages gained by additional amounts is lost because of the increased overhead. Gyration crushers are favored over the swinging jaw type. Finer crushing is suggested; it may increase production, lessen the wear on the grinding pans, or permit the use of lighter equipment. Underdriven pans with wearing parts of 2% manganese steel are recommended. The batch usually contains 8–40% of bats, 20% being very common. 5% of sand is sometimes added to reduce plasticity. The dry process of grinding is mentioned as a means of obtaining a more uniform grind but more careful standardization of the wet process and the use of ammeter charts is favored. A coarse grind is used to withstand the fluctuating temp. of the open hearth; finer grinds give better workmanship and a tougher brick for use in coke ovens. European manufacturers add 25% of impalpable powder (200 mesh) in order to obtain more rapid conversion to tridymite. Fresh lump, hydrated, or air-slaked lime all give a satisfactory bond. The details of lime slaking, mud storage, distribution, and brick molding are discussed. The molder can only be held for poor slicking and spongy corners. Rusting of pallets discolors brick; it may be overcome by painting with cheap cylinder oil or using enameled pallets. Vent bottom molds are used for small shapes, slip liner molds for large ones. In Germany 600–2500 small shapes are made per hour on the hydraulic press, under a pressure of 4000 lbs. per square inch. Amer. toggle presses are not very successful as they exert a press. of only 1000 lbs. per sq. in., whereas at least 1500 lbs. is necessary. Proctor driers are satisfactory for drying standard brick in 24 hrs. Tunnel driers operating at 200–325°F give good results in forty-eight hours; the lower temps. and longer time give least breakage. Brick entering the driers semi-dry give more trouble than those freshly made. Waste-heat driers are difficult to operate. Hot floors are very good especially for shapes; they are flexible and the product is strong. Good ventilation above the floor and exhaust pipes below are necessary to prevent condensation. Kiln construction is discussed. A 32' kiln with a 19-day turnover is favored over a 40' kiln with a 26-day turnover. Emphasizes regular cleaning of flues, flexible flash walls, and thick wickets. Under setting he gives details of foundation, benches, protection from flame, hot spots, allowance for expansion, and reduction of breakage. In heating up he advises a temp. increase of 33°F per hour up to 1500°F; at higher temp. less care is necessary. High volatile coal, slightly clinkering, low in sulphur, 14,000 B.t.u., is recommended. 1.6 T. per M. is mentioned as being necessary with round down-draft kilns to cone 18, 2.0 T. per M. to cone 20. Smaller amounts are used in Europe by burning to cone 15 in a Hoffman kiln. Cold spots are due to poor draft. He attributes 90% of breakage to rough handling, imperfect molding and drying.

10% to burning. This paper is original and of particular value in that it attacks the problem from the practical mfg. standpoint.

R. M. H.

Carbonization of clays. W. SMITH. *Min. and Met.*, **4**, 606(1923).—Abstr. of paper before Refrac. Mat. Sec. of Ceramic Soc. of England. S. shows that by satg. clay, at a certain stage of heating, with hydrocarbon gases or volatile hydrocarbons under press., the gases dissociate and deposit very finely divided carbon on the particles of clay. This occurs during the "biscuit" period when the clay has max. porosity and before firing contraction has set in. The clay thus carbonized is black and when contraction takes place during heating in the final stages of firing, great pressure is exerted on the enclosed particles of carbon and a dense, hard, composite body is formed. By firing in a strongly oxidizing flame this product may be converted into a microscopically porous structure, owing to burning away of the carbon, the refrac. properties being highly increased. For the black carbonized clay the term "carbonite" is suggested for indus. purposes. It is best adapted for abrasives, mixing with cement, roadmaking, etc.; it is refrac. to heat in absence of air and resistant to acids, as well as impervious to atmospheric action. For the white clay, from which the carbon has been burned out, the term "carbo-calcined" clay is suggested. Its refrac. properties are due to the artificially produced porosity and it usually does not melt at anywhere near the same temp. as the original mat. The durability of carbonized brick in indus. fur. is much greater than that of bricks made of untreated clay. Binding is accomplished by pressure, as with magnesite. Artificial binders should be used sparingly and with carbo-calcined mats. the binder should preferably be of the same compn. as the original clay. Carbonization increases the normal function of sillimanite. By special treatment of certain clays, the production of a brick, retort, and crucible consisting mostly of sillimanite has been accomplished on a small scale. Bricks of carbonized clay possess refractoriness and hardness and exhibit little or no contraction or expansion. See also *Ceram. Abs.*, **2** [8], 182(1923).

R. J. A.

Bauxite cements (Ciments fondus). GABRIEL PATROUILLEAU. *Le Ciment*, **28**, 259-60(1923).—It is suggested that the bauxite cement of av. percentage compn. SiO_2 12, Al_2O_3 44, CaO 44, with a corresponding mol. compn. 1 SiO_2 , $2 \text{ Al}_2\text{O}_3$, 4 CaO is a very basic oxysilico-aluminate of lime, which may be written SiO_2 , Al_2O_3 , $\text{CaO} + m\text{Al}_2\text{O}_3 + n\text{CaO}$.

L. N.

Refractories in the steel industry. J. S. McDOWELL. *Blast Fur. & Steel Plant*, **11** [11], 569(1923).—The phys. and chem. properties of the refrac. used in the blast fur. and steel indus. are listed and discussed, together with some notes on their requirements for use in various parts of different types of fur. employed in the indus.

C. R.

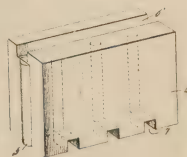
Appalachian bauxite deposits. W. A. NELSON. *Bull. Geol. Soc. Am.*, **34**, 525-39 (1923).—Upon boiling bentonite, formed from altered volcanic ash, with H_2SO_4 , practically all of the Al_2O_3 goes into soln. Treatment with tannic acid will then cause the Al_2O_3 to ppt. These expts., it is claimed, show "that the bentonite may very readily be the source of the Al_2O_3 in the bauxite deposits of the Appalachian region."

W. F. H. (C. A.)

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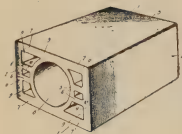
Refractory composition. JOHN L. OHMAN. U. S. 1,479,107, Jan. 1. A refrac. compn. for ht. resisting articles, comprising silicon carbide and fused silicon oxide, and cryst. graphite. See also *Ceram. Abs.*, **2** [10], 226(1923).

Baffle brick. FRANK H. WAITE. U. S. 1,478,309, Dec. 18. In a device of the class described, a brick comprising a rectangular body having a longitudinally extending channel in one longitudinal face thereof and a transverse channel in its opposite



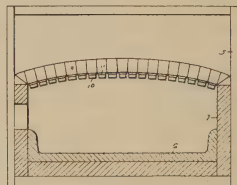
face, and an internal conduit connecting said channels. See also *Ceram. Abs.*, 3 [1], 15(1924).

Building tile. WILLIAM J. GILBERT. U. S. 1,477,258, Dec. 11. A building tile of the character described comprising rectangular outer wall portions, and inner web portion connected with said outer wall portions, all said inner web portions being thinner than any of said outer wall portions, said webs being arranged so as to provide a large central opening, and smaller side openings, said side openings comprising larger corner openings and smaller intermediate openings.

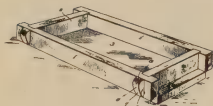


Process for manufacturing new and improved high refractory. CHARLES JAMES CRAWFORD. U. S. 1,477,810, Dec. 18. A silica brick consisting of tridymite bonded with a clay of high alumina content. The herein described method of mfg. a fixed volume high refrac. substance which consists of burning a silica material in a kiln the atmosphere of which is charged with a gaseous catalyzer formed independently of the material being treated.

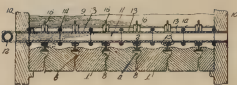
Metallurgical-furnace roof. CHARLES JAMES CRAWFORD. U. S. 1,477,811, Dec. 18. A fur. roof of refrac. material of staggered checker work construction.



Fire-brick mold. ROBERT L. KINTON and AMOS F. HIBNER. U. S. 1,478,746, Dec. 25. A mold comprising a bottom and encompassing walls and entirely open at its top to permit of unrestricted discharge of the molded product when the mold is completely inverted, the mold being provided upon one of its said walls with spaced rockers to engage a surface upon which the mold is to be overturned, the said rockers having accurate tread surfaces, the tread surface of each rocker, at one end, terminating substantially at the normally lower edge of the wall upon which the rocker is provided and at its other end merging substantially with the normally upper edge of said wall, the said tread surface of the rocker throughout its length describing a substantially cycloidal curve the higher portion of which is nearer the open top than the bottom of the mold.



Fire arch. HERMAN A. POPPENHUSEN. U. S. 1,477,895, Dec. 18. In a fire arch a plurality of laterally spaced beams, a plurality of rows of tiles, one row in each of the spaces between said beams and suspended therefrom, a plurality of conduits above said beams and adapted to have a cooling medium circulated there-through, said conduits extending across said beams, and means carried by said conduits and engaging said beams for suspending the same from said conduits.



Whiteware

Production of porcelain for electrical insulation. F. H. RIDDLE. *Jour. Am. Inst. Elec. Eng.*, 42, 988-94(1923); cf. *Ceram. Abs.*, 3 [2], 49(1924).—Deals with the firing of elec. porcelain. Methods of measuring temp.—thermocouples, pyrometric cones and shrinkage bars—are described, and the defects of periodic kilns dwelt on, these being chiefly loss by radiation and lack of recuperation and irregularity of draft which causes non-uniform temps. among saggars. A full description of the muffled tunnel kiln (Dressler) is given, with photographs of loading platform, entrance end and combustion chambers, together with a diagram of cross-section through the hot zone and a typical time-temp. record. In addition to economy of fuel, which may mean a saving of as much as 80% over the amount used in periodic kilns of equal output, the tunnel kiln

offers other advantages such as continuity of operation, slower deterioration of the brick-work, uniformity of ht. treatment and ease of loading and unloading. In discussing the mechanism of Dressler kiln, emphasis is laid on the need of maintaining very low draft velocity, both as regards air for combustion and the waste gases, and the equalization of temps. in the hot zone by convection, which is made possible by the circulation of air in the hollow carborundum chambers. The article is, on the whole, a distinct contribution to the physics of the tunnel kiln.

A. F. G.

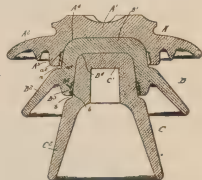
PATENTS

Improvements in refining clay, especially china clay. English Pat. 184,880. *Chem. Age, China Clay Trade Rev. Sec.*, **15**, (1923).—Kaolin residues are treated with 86 pts. water contg. 1 pt. of potash water glass in soln., for 5 to 10 min. in a colloid mill and then allowed to stand for $1\frac{1}{2}$ to 1 hr. in a tall vessel. In this time the whole of the silicates have been pptd. and particularly pure kaolin is present in fine suspension which is so fine that it shows Brownian movement in the ultra microscope and remains suspended for a long time. This was not to be foreseen since it was known that the above kaolin residues are at present considered waste products which have to be thrown away. The above process, however, allows of the recovery of as much as 40% kaolin, and more, while the silicates which are simultaneously obtained are also of high value. O. P. R. O.

Improvements in or relating to manufacturing of china clay. ANON. English Pat. 188,010. *Chem. Age, China Clay Trade Rev. Sec.*, **9**, 15(1923).—A method of mfg. china clay according to which clay of large water content is pptd. as by settlement in a tank, centrifugal sepn. or the like, and the sepd. water is removed until a desired av. consistency is reached, after which the densest clay is removed from the pptd. layer, say, by suitable conveyor or other detaching means, without removal of the wetter portion, and the drying of said denser clay to any desired degree is completed upon a surface htd. by compressed evolved vapor. A drier is continuously supplied with clay of the desired uniform consistency, say by the combined opern. in sequence of a plurality of settling tanks, having mech. removal devices, centrifugal sepg. means or the like. The clay is refined by carrying it as a fine powder in a moving gaseous medium from which it is deposited in a selected condition.

O. P. R. O.

Insulator. BENTLEY A. PLIMPTON. U. S. 1,478,912, Dec. 25. An insulator comprising a plurality of nested hollow sections having closed ends, the outer surface of the sides and end of the inner section fitting closely against and contacting with the inner surfaces of the sides and end of the outer section, one of the sections having a recess formed in its side opposite the adjacent surface of the cooperating section, and a cementing medium in said recess.



Equipment and Apparatus

A cheap electric resistance furnace of the tube type. H. FORESTIER. *Bull. Soc. Chim.*, **33**, 999-1000(1923).—A tube type fur. which is capable of hgt. to 1000° in 30 min. and drops to 100° in $1\frac{1}{2}$ hrs. after turning off current is described. Around a metallic tube (3-4 cm. diam. for example) is wrapped a piece of paper. Over this is wound the resist ($3\frac{1}{2}$ -4 m. of nichrome wire $\frac{1}{2}$ mm. diam.). The resist. winding is covered with a thin coat of alundum 1 to 2 mm. thick. This is htd. several min. in an oven. When dry the tube is placed vertically in a cylinder of asbestos paper and the space between filled with rapid setting cement. It is dried in the air some hrs. and then covered with asbestos insulation 3 to 4 cm. thick. It is then heated by passing a current through the resist. This chars the paper and allows the metallic tube to be

pulled out. Under the writer's conditions using 110 v., 4.5 amp. or about $\frac{1}{2}$ kw. were consumed.

W. R. K.

The standardization of commercial viscosimeters. MADISON L. SHEELY. *Jour. Indus. Eng. Chem.*, **15** [11], 1104(1923).—The need of the standardization of viscosimeters and the advisability of expressing results in abs. units, is discussed. Method of calibrating and set up and operation of a typical glass outflow type of viscosimeter is given, with comparisons of various similar types. Calibration of the MacMichael, or torsional viscosimeter for a single range of viscosity is given and comparison with other types made. Results on the MacMichael viscosimeter indicate uniformly higher viscosities than obtained with out-flow types of colloidal solns. The suggestion is made that the lower velocities in the former have less effect in breaking down the colloidal aggregate, or cause a difference in rate of shear, resulting in apparent discrepancies in the absolute viscosity detn. with the 2 types. Results on true solns. compare quite well in both types of app., which lends force to the suggestion. A brief discussion of solns. suitable for use in calibrating viscosimeters is given. In general, non-volatile oils are recommended for this purpose for comparatively high viscosities.

R. D. L.

Notes on the Proctor drier. A. H. MIDDLETON. *Brit. Clayworker*, **32**, 226-31 (1923); Also *Pottery Gaz.*, **48**, 1803-4(1923).—For abstract see *Ceram. Abs.*, **3** [1], 19 (1924).

R. D. L.

A new air preheater. F. S. N. HEWARD. *Combustion*, **9** [5], 393(1923).—Heat is carried in a mech. way to air for combustion. A fan draws fresh air into the upper portion of a casing which is divided in two parts by a vertical partition. The air is confined to one side of the partition, passing downwards to a similar semi-circ. chamber through a porous drum or rotor, and then to fur. Hot flue gases pass in opposite direction through rotor in second chamber, and to stack. Rotor transfers ht., and moves about 6 r.p.m., being made of thin sheet steel, and divided into sectors by radial plates. Ease of cleaning, no serious effect due to deposition of soot and tarry matter, and liberal htg. surface with very little obstruction to passage of air and gases in comparatively small dimensions pointed out.

C. R.

Induction furnaces for non-ferrous metals. EMILE DEMENGE. *Rev. métal.*, **20**, 448-52(1923).—After a brief outline of the merits of induction furnaces, D. described in detail a furnace used by the Compagnie Française des Métaux which can effect continuous or variable agitation of the molten metal, allows of decanting clean metal, reduces oxidation and radiation losses to a min., and can be connected directly and simultaneously to the 3 phases of an ordinary circuit with an acceptable load factor. Also in *J. four élec.*, **32** 53-5(1923).

A. P.-C. (C. A.)

Constant-temperature regulator for electric furnaces. JEAN SOLARI. *Bull. soc. chim.*, **33**, 1000-4(1923).—A device is described for maintaining const. within $\pm 5^\circ$ (at 575°) the temp. of a resistance furnace. The regulator is a differential air thermometer actuating a Hg column which connects or cuts out added resistance in series with the main furnace. An auxiliary furnace in series with the furnace to be regulated contains the hot bulb of the differential thermometer. The main furnace is thus entirely free of obstructions. The auxiliary furnace has little thermal lag, thus causing the regulator to respond promptly to variations in the furnace current.

L. J. (C. A.)

A simple method of optical pyrometer calibration. FR. PATZELT. *Z. Physik*, **15**, 409-12(1923).—The positive crater of the carbon arc, like various standard combustion lamps, can be used as a standard of luminous intensity and therefore, with optical pyrometers, of effective temp. To this end it is necessary that the carbon should be of definite purity, and the current between 0.2 and 0.5 amp./mm.² A very pure carbon is

naturally best. A pure carbon (mark "A" of Gebrüder Siemens & Co., 6 mm. in diam., with 15 amps.) gives a "black temp." of 3780°K. Errors may come from inaccurate optical arrangements, from impurity, and from the photometric adjustment.

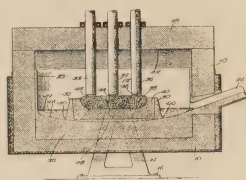
W. P. W. (C. A.)

A new centrifugal for separating solids from liquids. C. R. PLATZMANN. *Chem.-Ztg.*, **47**, 167-8(1923).—A description, with 5 cuts, of the app. of the Centrifugal Separators, Ltd., London, which combines features of the centrifugal and filter-press. The advantages of the app. are: low 1st cost, low operating cost, can handle suspensions for which presses are not suitable, independent of temps., small floor space, and the sepn. of the solids according to size of grain.

J. H. M. (C. A.)

PATENTS

Electric melting furnace. ALFRED W. GREGG. U. S. 1,477,821, Dec. 18. In a device of the class described, a fur. chamber inclosing a hearth, sloping continuously downward from the side walls of the chamber towards its center, a central island in the hearth, and means for creating an elec. arc on the island without passing elec. current through material to be melted on the hearth. See also *Ceram. Abs.*, **2** [7], 166(1923).

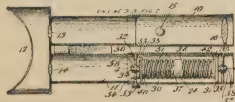


Means for producing a sooty vapor in electric furnaces. GEORGE M. LITTLE. U. S. 1,477,372, Dec. 11.—An elec. fur. comprising a plurality of walls enclosing a fur. chamber, a carbonaceous resistor located in said chamber, a plurality of feed-pipes entering said chamber and a single means for permitting a fluid sooty-vapor-producing agent to enter said chamber through one pipe and a fluid oxidizing agent through the other pipe.

Electric resistance furnace. GEORGE M. LITTLE. U. S. 1,479,143, Jan. 1. In an elec.-resistance fur., in combination, a plurality of refrac. walls inclosing a fur. chamber, a plurality of refrac. muffle tubes extending through said chamber, and a relatively narrow, elongated refrac. resistor member located in the chamber below said muffle tubes and extending transversely thereof, thereby obtaining a predetd. temp. gradient from the intermediate portion of said muffle tubes to the ends thereof. See also *Ceram. Abs.*, **2** [9], 205(1923).

Optical pyrometer.

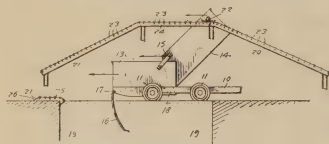
RICHARD P. BROWN and CHARLES P. FREY. U. S. 1,476,486, Dec. 4. In an optical pyrometer comprising in combination, a light standard, a rheostat arranged to vary the intensity of said standard, a scale representing temp. or temp. equivalents having a calibrated relation with respect to said rheostat, said light standard and said scale being simultaneously visible, and means to move said scale and rheostat in synchronism.



Electric resistance furnace. THOMAS A. REID. U. S. 1,477,384, Dec. 11. An elec. fur. structure comprising an open ended and open top metallic casing, a removable metallic top plate for said casing interlocked therewith, an outer base plate, two spaced apart outer side plates, and an outer top plate inside of said metallic casing, all of said plates being of refrac. ht.-insulating mat., an inner base plate, a pair of spaced-apart inner side plates and an inner top plate, all located inside of said ht.-insulating plates and comprising refrac. high-temp. resisting mat., and spaced apart to provide a fur. chamber, and a htg. element for said fur. chamber comprising a plurality of relatively thin refrac. plates constituting a lining for said fur. chamber and a resistor member held in proper operative position in said fur. structure by said thin refrac. plates in coöperation with the plates constituting the inner lining.

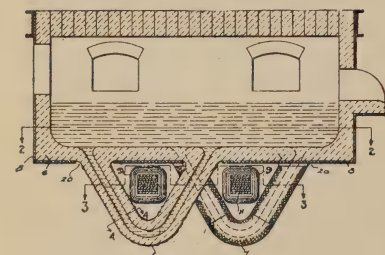
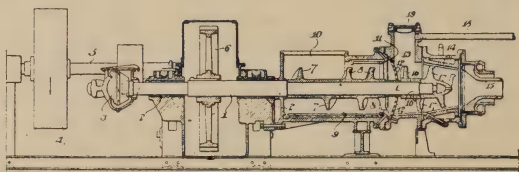
Electric furnace. THOMAS A. REID. U. S. 1,477,385, Dec. 11. In an elec. fur., in combination, a plurality of walls enclosing a fur. chamber, a plurality of relatively thin refrac. plates constituting the lining of said chamber, and relatively thin, shaped, refrac. members located between the adjacent edges of the refrac. plates, and independent of said walls for maintaining them in proper operative positions relatively to each other. See also *Ceram. Abs.*, 2 [6], 136, [9], 207(1923); *Ibid.*, 3 [1], 20(1924).

Electric furnace. ORA A. COLBY. U. S. 1,477,313, Dec. 11. An elec. fur. comprising a supporting means and a resistor rod having a plurality of integral flattened portions located in said supporting means.



releasing said hinged bottom, and means for tilting said tiltable body.

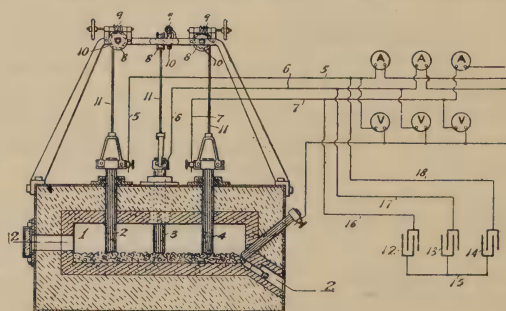
Method and means for working clay. RALEIGH H. STALEY. U. S. 1,478,842, Dec. 25. The method of treating clay, which consists in introducing the clay in a plurality of relatively small streams into an enclosed space, exhausting the air from said space and then extruding the clay therefrom. In a device of the character described, the combination of means forming an enclosed chamber provided with an extrusion orifice, means for forcing clay into said chamber in a plurality of separated streams, means for exhausting air from said chamber and means for extruding the clay therefrom.



ness throughout its length and surrounded by a pervious metallic jacket, whereby said wall may be maintained at a relatively cool temp. to prevent permeation of the molten metal through the channel wall.

Electric furnace. MORRIS H. BENNETT. U. S. 1,478,375, Dec. 25. The combination with a fur. for melting metals, of means for delivering a main htg. current directly to the charge in the fur. and means for impressing on said main current a htg. current of high

Induction furnace. CHARLES A. BRAYTON, JR. U. S. 1,479,582, Jan. 1. In an induction fur., the combination of a bath, a closed channel of uniform cross-section thereunder and connected therewith and leading to and from the bath, said channel having a comparatively thin wall of substantially even thickness



frequency, the resulting current producing improved htg. effects in the fur. due to the resistance of the charge to said current.

Kilns, Furnaces, Fuels and Combustion

The application of tunnel kilns in the firing of ceramic wares. C. B. HARROP. *The Clayworker*, **80**, 34(1923); *Brick and Clay Record*, **63**, 18-19(1923).—An address given at the summer meeting of New Jersey Clay Workers Association and Eastern Section of the AMERICAN CERAMIC SOCIETY. H. brought out that in the use of the tunnel kiln as compared with the periodic operation, there is a saving of 50 to 85% in fuel. Moreover, a higher type of kiln burner is necessary for successful operation of tunnel kiln. A chart was presented (given below) which set forth all tunnel kilns of different types, that have been constructed and operated with more or less success during the past 13 years.

| Character of ware | No. of kilns | Character of ware | No. of kilns |
|----------------------|--------------|-----------------------|--------------|
| Vitreous China | 3 | Brick and Hollow Tile | 15 |
| Semi-porcelain | 9 | Drain Tile | 1 |
| Sanitary Ware | 14 | Roofing Tile | 2 |
| Cooking and Art Ware | 1 | Electrical Porcelain | 8 |
| Stoneware | 2 | Carbon Electrodes | 3 |
| Refractories | 6 | Abrasives | 1 |
| Floor and Wall Tile | 12 | Specialties | 2 |
| Terra Cotta | 1 | | |

J. W. H.

Oil firing of clay products. W. D. RICHARDSON. *The Clayworker*, **80**, 142-3 (1923).—On basis of heat units 1 T. of fuel oil is approx. equiv. to 1.46 T. of coal, but on basis of actual opern. 1 T. of fuel oil is equiv. to 1.79 T. of coal. Using this latter figure and considering av. wt. of fuel oil as 7.7 lbs. per gal. the following table gives the equiv. prices of coal at kilns and of oil in storage at kilns.

| Oil, price per gal. | Coal, price per ton | Oil, price per gal. | Coal, price per ton |
|---------------------|---------------------|---------------------|---------------------|
| 0.02 | 2.91 | 0.055 | 7.99 |
| 0.025 | 3.63 | 0.06 | 8.72 |
| 0.03 | 4.36 | 0.065 | 9.44 |
| 0.035 | 5.08 | 0.07 | 10.17 |
| 0.04 | 5.81 | 0.075 | 10.89 |
| 0.045 | 6.54 | 0.08 | 11.62 |
| 0.05 | 7.26 | | |

Advantages of fuel oil are given. (1) An equal wt. of oil can be stored in approx. $\frac{2}{3}$ of space required for coal, and an equal vol. of oil has 50% greater heating value than coal. (2) Fuel oil does not deteriorate in storage to any appreciable extent. Coal deteriorates in storage. (3) No ashes, clinker or dirt when oil is burned. (4) Smoke almost entirely eliminated. (5) Oil handled cheaper than coal; no handlers or stokers req. (6) A more intense heat can be secured with oil. Also, a more uniform ht. and better regulation. No opening of fur. doors, with an inrush of air and no lowering of temp. from cleaning of fires. (7) A smaller per cent of excess air is required, hence a smaller vol. of waste gases and greater economy. (8) Flue gas analysis shows less fuel is lost through stack.

J. W. H.

Oil firing clay products. W. D. RICHARDSON. *The Clayworker*, **80**, 340-2(1923).—Article deals with the atomizing of oil. The three main atomizing systems used are: (1) steam, (2) air, (3) mechanical. The fundamental factors are delivery of oil at a

uniform pressure, free from water and foreign matter, absolute control of all the fuel and air entering the fur. and regulation of the air in propn. to the fuel req. Cuts are given of several burners on the market.

J. W. H.

Maintenance and rebuilding of round down-draft kilns. E. E. AYARS. *Brick and Clay Rec.*, **63**, 181-5(1923).—Experience indicates that, when a brick kiln shows age, it pays to rebuild it throughout. Some reasons are given in the discussion of rebuilt kilns (32 ft. pit kilns). This type of kiln has various disadvantages, but affords increased setting capacity and the small flues are more easily cleaned. Foundation is concrete. Tunnel is almost entirely silica brick which is recommended also for the floors and flues. Washing the interior with a clay slip is advantageous if pure high grade clay is used, a high alumina wash gives good results as it does not glaze readily. Repair clays and washes should contain at least 25% of fire-brick bats or calcine ground with clay. Repair clay should pass a 20-mesh and washes through a 30-mesh screen. Shrinkage cracks should be filled with grog to which a small amount of plastic clay is added.

J. W. H.

Insulation of kilns. J. H. KRUSON. *Brick and Clay Rec.*, **63**, 22-6(1923).—This article deals with insulation (diatomaceous earth) of walls and crowns of down-draft kilns, used in firing fire-clay refractories. A report from 25 plants using crown and wall insulation estimates a fuel saving from 15 to 25%, while for crown insulation, only 10 to 15% is reported. The total furnace area could be reduced 10% and there would still be sufficient capacity for proper burning. Improved quality of ware is reported. Several graphs showing heat losses through various kiln walls (insulated and bare) and types of crowns accompany the article. Tops should be left bare for two burns to allow for settling, and then should be waterproofed. By proper insulation the wall thickness may be reduced about one-third.

J. W. H.

The practical use of oil fuels. A. F. BREWER. *Combustion*, **9** [5], 379(1923).—Prac. suggestions are given on cleanliness, fire hazard, ventilation, soot blowers, pumping and straining, repairing leaks, and flaming at stack. Burners extinguished by clogging, water in oil, too great amt. excess air, occasional slugs of air in oil line. Explosion and flareback caused by attempting to relight from seemingly hot wall, accumulation of explosive gases from leaky burner valve, insufficient ventilation of fur. prior to lighting. Steam and air atomization with air chamber requires 30-50 lb. press., without, 100 lb. press. or over to avoid pulsation. Dry steam is necessary or flame sputters. Mech. atomization requires approx. 150 lbs. press. and oil at nearly const. temp. and press.

C. R.

Efficient use of liquid fuel. H. A. ANDERSON. *Foundry*, **52** [1], 29-30(1924).—The efficiency of an oil burning system is greatly dependent on the type of burner, its location in the fur. and the oil and gas press. employed. Insulation shows small savings on fur. operated a few hrs. each day. Light colored surfaces cut down radiation losses. Oil feeding systems are discussed, and the circulating system with a rotary pump recommended.

M. E. M.

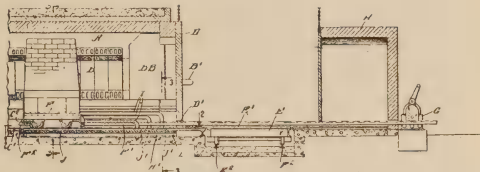
Excess air and fuel consumption in kilns. P. THOR. *Tonind. Ztg.*, **95**, 723-4 (1923).—Firing control app. may often be purchased for the price of 3000-4000 brick which will make it possible to save 30% fuel. This app. is the draft gage which has become indispensable to the brick indus. The draft gage, however, merely gives the variations in draft and does not tell us the compn. of the gases. The CO₂, O₂, CO, and N₂ contents of the chimney gases may be detd. with an Orsat app. or a Cramer chimney gas tester. It is possible to make 20 detn. per hr. with one of these. In regular firing practice it was found that variations in the chimney gases do not always occur in kilns having different diameters but may also occur in the same kiln for reasons not always explainable. Gas anal. of the chimney gases at frequent intervals is the only

safe way to control kilns. In general it may be said that kilns performing the best give a comparatively high anal. for CO_2 , this being 7-8%. Poorly performing kilns have a content of CO_2 in their chimney gases varying from 2 to 4%. Where the gas analyses shows a low CO_2 content it indicates that the draft is too strong and considerable fuel is wasted due to the htg. up of excess air. In such cases the resist. to draft should be increased this being most conveniently done by lowering the damper.

H. G. S.

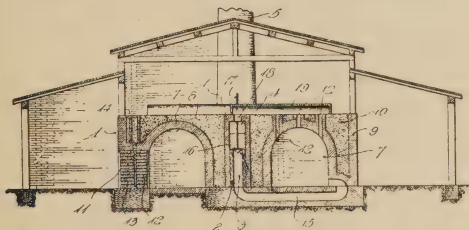
PATENTS

Tunnel kiln. HARRY M. ROBERTSON. U. S. 1,477,152, Dec. 11. The combination with a continuous tunnel kiln and the goods carrying cars movable through it, of means for withdrawing the goods carrying cars from the exit end of the kiln comprising a dummy car, means for moving the dummy car into and out of the kiln at its exit end, and means for detachably coupling the dummy car to the goods carrying car.



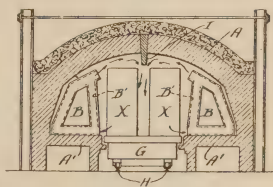
Brick kiln. BAPTISTE F. CANAVERA. U. S. 1,479,368, Jan. 1. A kiln comprising a central wall whose upper portion is hollow and forms a horizontal flue leading to a stack, the lower portion of said wall having vertical passages in valved communication with the flue and the

upper portion of the wall having inlet passages; a continuous tunnel surrounding said central wall and having down-draft flues in its bottom discharging into said vertical passages, the outer wall of said tunnel having temporary fire openings while the



crown of said tunnel is formed with fuel feeding openings; and arched transversely disposed conduits resting removably on and extending between the crowns of said tunnel and said horizontal flue, said conduits being in communication with said fuel feeding openings and the upper inlet passages of said horizontal flue whereby to establish communication between the upper portion of the tunnel and the horizontal flue when said conduits are in place.

Continuous tunnel kiln. LAURENCE ARTHUR VINCENT. U. S. 1,477,675, Dec. 18. In a continuous tunnel kiln comprising an elongated kiln chamber with a goods pathway therethrough and combustion chambers extending longitudinally of the kiln chamber at opposite sides of the goods pathway in the high temp. zone of the kiln chamber, whereby the goods are largely htd. by a convection current circulation of the kiln atm. upwardly past the combustion chambers and downward in the central portion of the goods pathway, the improvement which consists in a longitudinally extending baffle in the kiln chamber above the goods pathway.



Geology

Marketing of talc. RAYMOND B. LADOO. *Eng. Min. Jour. Press*, 113, 963-5 (1922).—Lists, uses, markets and methods of marketing. Describes briefly properties

of crude talc from Vermont, New York, North Carolina, California, Canada, France and Italy. Notes absence of standard specifications. S. I. G.

Soapstone deposit in Ontario. AURION. *Eng. Min. Jour.-Press*, **114**, 1071 (1922).—Wabigoon Soapstone Co., Ltd., organized to develop deposit 200 miles N. W. from Fort Williams. Said to be only workable deposit of soapstone known in Canada. S. I. G.

Non-metallic mineral wealth of Russia. SYDNEY H. BALL. *Eng. Mining Jour.-Press*, **114**, 985-9 (1922).—A résumé of resources with historical sketches of production of several minerals. Brief descriptions of distribution and geology of coal, petroleum, clay, salt, asbestos, magnesite, barite, diatomaceous earth, etc. S. I. G.

Feldspar. ANON. Dept. of Mines (Western Australia), *Ann. Rept.*, p. 72 (1922).—Feldspar occurs as the chief constituent of a big pegmatite dyke situated near Jacob's Well. A large quantity could be obtained by means of a quarry or open cut. It is slightly kaolinized, suitable for use in pottery and enameling trades. O. P. R. O.

Magnesite. ANON. Dept. of Mines (Western Australia), *Ann. Rept.*, p. 70 (1922).—Deposits of magnesite have been found in the vicinity of Coolgardie, samples of which prove it to be of excellent quality for making Sorrel cement. As the demand for magnesite in recent years has far exceeded the supply the new prospect is of considerable economic importance. It is now used in the manuf. of marbleite, which differs from marble in that the lime is replaced by magnesite. O. P. R. O.

Fluorspar lode. E. C. SAINT-SMITH. *Queensland Gov. Min. Jour.*, **24**, 418 (1923).—This fluorspar lode, Chillgoe Dist., Queensland, under review is one of the most important deposits of high quality fluorspar yet recorded in the Commonwealth of Australia. It is of comparatively large tonnage, and economically available. O. P. R. O.

Silica sands. ANON. *Indus. Australian and Min. Stand.*, **70**, 707 (1923).—Silica sands of Western Australia are known to compare favorably with those found in any other parts of the world. O. P. R. O.

Ironsand. W. DONOVAN. *N. Z. Jour. Sci. and Indus.*, **6**, 140 (1923).—In the ironsand of Taranaki the oxide of a new element has been discovered, which it is stated is a refrac. silicate of titanium. Mineralogically, the Taranaki ironsand consists principally of magnetite, ilmetite, ferro-magnesium minerals, such as augite and hornblende, some olivine and quartz; zircon is occasionally present. From the chemical standpoint the most noticeable feature of the sand is the presence of about 10% of TiO_2 . D. gives analyses of various ironsands and a summary of the attempts to manuf. iron from these sands; he is convinced that the recovery and utilization of by-products are essential factors in the manuf. of iron from Taranaki ironsand; but if a process could be devised which would not only produce iron, but at the same time recover the titanium dioxide, an exceptionally good pigment, non-poisonous, with a greater covering power than white lead, and ferro-titanium, often a constituent of pottery glazes, the ironsands would be commercially profitable. O. P. R. O.

The lime belt of Massachusetts and parts of eastern New York and western Connecticut. T. N. DALE. U. S. Geol. Survey, *Bull.* **744**, 67 pp. (1923).—Seven quadrangles with their lime deposits are described. The *calcitic limestones* are classified as (1) those used for finishing lime, (2) those not making the best finishing lime, (3) those discarded on account of accessory minerals, and (4) those discarded on account of texture or content of Mg. The *dolomitic limestones* are classified as (1) those used for magnesian lime, (2) those discarded on account of accessory minerals, and (3) those discarded on account of behavior under fire. Chem. analyses of 13 specimens are recorded and 13 photomicrographs of thin sections are shown. The granular and semi-granular dolomitic limestones are described, also the structure exposed in various

quarries. The relations of geologic formation to cost of quarrying and to future prospecting are indicated. L. W. R. (C. A.)

Selenium and tellurium. S. SKOWRONSKI. *Mineral Ind.*, **31**, 621-5(1922).—A review of production and technical progress, with a bibliography. A. B. (C. A.)

Talc and soapstone. F. B. PECK. *Mineral Ind.*, **31**, 658-66(1922).—Markets, trade, production and consumption, and properties are discussed. A. B. (C. A.)

Chemistry and Physics

The measurement of thermal conductivity. EZER GRIFFITHS AND G. W. C. KAYE. *Proc. Royal Soc. (London)*, **104A**, 71(1923).—Thermal condy. is a phys. const. not capable of ready detn. by simple appliances: the aim in the design of app. described has been to produce an equipment which will give the desired data with min. expenditure of time and labor. Three types of app. are described, for rapid precision detn. of thermal condy. of mats. of low condy.; all three types are modifications of the "plate" or "wall" method to which the stand. equation defining condy. (k), $Q = kA.t - \frac{\theta_1 - \theta_2}{d}$

is directly applicable. App. No. 1 was designed for the study of mats. in the form of discs $\frac{1}{2}$ mm. to 4 mm. thick and about 45 mm. in diam. This app. is especially convenient for mats. of a slightly compressible nature, such as cardboard and various hard timbers, which could not be tested between amalgamated plates, owing to the penetration of the mercury into the pores of the mat. App. No. 2 was designed primarily for those mats. of which the contact resistance at the hot and cold plates is high and for which the use of amalgamated plates becomes necessary. The design of the mounting of this app. proved also to be convenient for the study of the variation from point to point in the conductivity over the areas of a large sheet of mat., such as ebonite or micanite. App. No. 3 is a somewhat specialized form of No. 2, adapted in the main for carrying out meas. on mats. which are only available in very thin layers (*e. g.*, certain fabrics, micas, and mica compositions), so that the ht. transmitted for an appreciable temp. difference was very considerable. This necessitated the use of a heavier type of heating coil which was totally enclosed in a block of copper. Energy was supplied by elec. means, a meas. of both the energy entering and leaving the test specimen being made. Temps. were meas. by thermocouples. The samples were thin and no guard ring was required. An average time for the attainment of the "steady state" was 30 min. or less, and the average accuracy of meas. of the condy. was about 1%. Among the points dealt with in the paper are the thermal resistance at the bounding faces of a mat., the effect of superimposing layers of compressible mat., the meas. of the thickness of compressible mat., the dependence of the condy. of timber on structure and the moisture content, the variation of the condy. of rubber with mineral content, etc. The figs., illus. and tables accompanying the paper are very comprehensive, Table 13 giving a summary of the results on the thermal condy. of various mats. O. P. R. O.

Solid solutions. W. ROSENHAIN. 1250-N (Preprint), Inst. of Metals Division, Am. Inst. of Min. and Met. Engrs., New York meeting, Feb. (1923).—This paper by R. is the second annual lecture before the Inst. of Metals Division of the Am. Inst. of Min. and Met. Engrs. and deals largely with the internal structure and constitution of solid solns. of metals. A solid soln. is defined as a cryst. body formed from a liquid soln. or from an intimate mixt. of solids, or of liquid and solid, that retains in the solid state an admixture of the two subs. (solvent and solute) as intimate as that which exists in a liquid soln. The manner in which solid solns. are formed is considered on the basis of thermal diagrams of equilibrium. While the questions as to how and why solid solns. form have been answered hitherto on the basis of thermo-dynamical formulas,

this does not really give a satisfactory phys. conception of what actually occurs, and R. develops a purely phys. conception. The nature of the solid-soln. crystal is discussed on this basis and as regards its behavior on melting and freezing. It is pointed out that a solid-soln. crystal is a self-strained structure, owing to its lowered m. p. with increasing concentration. This means that the amt. of kinetic energy that must be communicated to the constituent atoms or molecules of the crystal to bring about disruption or melting is lessened by increasing concentration of the solid soln. Therefore, the crystal itself must contain stored-up energy, and the degree of solid soly. must be detd. by the max. amt. of energy that can be stored. Recently, the results of X-ray crystal analysis have thrown an enormous amt. of light on the structure of crystals and of solid solns. X-ray spectographs show that crystals are built up of atoms arranged upon space lattices, and when the atoms of a pure metal are arranged upon a space lattice, whose dimensions are known, there can be no considerable interstices between the atoms. In considering the formation of a solid soln., the question naturally arises as to where the atoms of the dissolved metal go when they pass into solid soln., and the only feasible view appears to be that they take the place of some of the atoms in the solvent metal, upon its own space lattice. Such substitution must produce a powerful effect upon the whole of the lattice, or at least in the neighborhood of the solute atom. This effect is in the nature of a distortion, and such distortion is greater or less, depending upon the similarity, or otherwise, of the solute atom to the solvent. Moreover, the relative amt. of local and general distortion of the lattice will depend upon the nature of the lattice itself. If the lattice is flexible, the distortion is likely to be mainly local, whereas if stiff, local distortion will be resisted and there will be correspondingly increased general distortion. Measurements by Owen and Prestol of the lattice dimensions in the copper-aluminium solid solns. at the copper end show that the differences between the observed and calculated density figures are very small, and their observations are in accordance with the substitution theory. Of course, the number of solute atoms that can be introduced into the space lattice of a solvent must be limited, but this limit depends upon the amt. of distortion that the introduction of each atom produces. The amt. of distortion that a lattice undergoes determines the extent to which the hardness, strength, and ductility of a crystal are affected. Distortion causes a disturbance of the smooth gliding surfaces by means of which plastic deformation takes place, and thus produces a hardening of the metal. Hence, the hardening effect of an alloying element present in solid soln. is approximately inversely proportional to its solid solubility, and a number of examples of alloys are cited to show that this relationship holds. A property of solid solns., even more typical, perhaps, than hardness, which also finds ready explanation on the basis of the substitution theory, is the lowering of the melting point and the spreading of melting and freezing over a range of temperature. Melting can be described as a separation of atoms on the space lattice beyond a definite limiting distance. Where the lattice is perfectly uniform, as in a pure metal, this separation occurs throughout the whole of the crystal at a single and definite temperature. But in a solid solution, where the lattice is either locally or generally distorted, different parts reach their limiting inter-atomic distance, *i. e.*, their melting point, at different temps. Melting, therefore, begins at a temp. which may be considerably lower than that at which the whole of the crystal becomes liquid. When the solvent metal is hard and strong, and the lattice distortion is therefore general rather than local, there is not much difference in temp. between the beginning and the end of melting or freezing; but when the solvent metal is soft, and the lattice distortion is apt to be local rather than general, wide differences are noted. Striking confirmation of the theory is found from consideration of alloys in which the addition of the alloying element causes a rise in the m. p. This is found to be associated with a contraction of

the lattice dimensions, as opposed to an enlargement in the case where the melting point is lowered, precisely as would be expected from the theory. On the basis of the theory, explanation of the mechanism of how diffusion occurs in a solid soln. is given as well as explanations for solid solns. containing several kinds of solute atoms and for the nature and brittleness of intermetallic compds.

R. J. A.

Charts for estimating temperature distributions in heating and cooling solid shapes.

H. P. GURNEY AND J. LURIE. *Jour. Ind. Eng. Chem.*, **15** [11], 1170(1923).—A number of charts are graphically represented, simplifying the calcs. necessary in detg. temp. changes occurring in htg. and cooling solid shapes. These include unaccomplished temp. change ratios in slabs, cylinders and spheres initially at uniform temp. and approaching another uniform temp., initially at uniform temp. but with the surface temp. uniformly varying from the initial value and momentary values in semi-infinite solids. Where thermal conductivity, thermal diffusivity and surface emissivity are known, or can be assumed, examples of the calcs. involved are given for slabs of rubber and glass and a steel ingot. These illustrate time necessary for arriving at a uniformly higher temp., time-temp. rate of change at any distance from the surface when temp. is suddenly lowered and temp.-time relations at varying distances from the surface when subjected to uniform temp. rise for a definite time.

R. D. L.

The proportion and composition of colloidal matter in clay. A. VASEL. *Kolloid. Zeits.*, **3**, Sept.(1923); *Tonind. Ztg.*, **47**, 726(1923).—V. studied the colloidal content of Meissen kaolin by detg. the per cent of fine clay sol. in an HCl sol. This clay was composed of 32.47% quartz, 65.03% clay subst. and 2.50% feldspar. It had a sp. gr. of 2.583. 10 gms. of clay were boiled in 200 cc. of 10% HCl for 4 hrs. In a 2nd series of tests it was boiled in a 5% sol. of HCl for 6 hrs. In a 3rd series the sol. was first poured off after standing 4 weeks. In each case the residue was had with NaOH (sp. gr. 1.04) in order to remove any silicic acid which may have been formed. The mol. amt. of Al_2O_3 and SiO_2 varies as follows, using Al_2O_3 as unity: 1: 2.08, 2.06, 2.01, 2.19, and 2.22 showing that these constituents are present in the clay in approx. the kaolinite ratio. 3% of mat. was removed from the clay by these treatments so V. concluded that this clay has at least 3% colloidal matter since only the extremely fine grained mat. would be dissolved by this treatment. The clay, however, was equally as plastic after this mat. had been removed as it was before the treatment. Hence it must be that only a portion of these colloids was removed by the treatment.

H. G. S.

Chromium oxide and salts, chromates, barium chloride. A. B. MOND (Chemische Fabril Griesheim-Elektron, Germany). *Brit. Pat.* 25,720, *Oil & Color Trade Jour.*, **64**, 2186(1923).—Alkali chromates; chromium oxides and salts; barium, chromium, and iron chlorides. Chrome iron ore is converted into ferrochromium in the known manner, the ferro-chromium is dissolved in hydrochloric acid and the chromium pptd. as hydrated oxide by calcium or barium carbonate. The ppt. is sepd. and used to produce alkali chromate, or chromium salts. The filtrate, if barium chromate is used, is evapd. and cooled to separate barium chloride, and the mother liquor may be evapd. to obtain ferrous chloride. In the pptn. of the chromium hydrate it is preferred to use granular limestone or witherite and hot chloride soln.

O. P. R. O.

Thermal conductivities of some metals in the solid and liquid states. W. BYRON BROWN. *Phys. Rev.*, **22**, 171–80(1923).—Thermal conductivities of some metals and eutectic alloys above and below their m. p., 50° to about 400°C. A guard ring method of measurement was used. A cylindrical rod of the metal, 1.5 cm. diam. and 12 cm. long was surrounded by a slate tube and outside that a hollow brass cylinder. Both rod and cylinder were independently heated elec. at the top and cooled by flowing water at the bottom so as to maintain the same temp. gradient in both, as shown by thermo-

couples. The input of energy into the rod was corrected slightly for heat leakage and divided by the temp. gradient times the area to get the condy. The conductivities of tin and cadmium decrease at the m. p. by over $\frac{1}{3}$ and $\frac{1}{2}$, respectively. For thallium, there is a drop of $\frac{1}{10}$ at about 120°C indicating a polymorphic change. The temp. coeff. are about the same before and after melting, being -5×10^{-5} (Sn), $+21 \times 10^{-5}$ (Cd), $+8 \times 10^{-5}$ (Th). For the eutectics: Sn 0.92, Zn 0.08; Sn 0.62, Pb 0.38; Pb 0.87, Sb 0.13; Pb 0.46, Bi 0.54; the temp. coeff. for the liquids are all positive and have values at 300°C , from .0011 (Pb - Bi) to .0030 (Pb - Sb) close to those found for gases at that temp., indicating that the mechanism is similar in the two cases. Below the m. p. the curves vary, one increasing with temp. (Sn - Zn), two decreasing, and one reaching a max. (Pb - Sb). The sudden decrease on melting varies from $\frac{2}{3}$ for (Sn - Zn) and (Pb - Sn) to $\frac{1}{10}$ for (Bi - Pb). A. F. G.

Thermal conductivities of metal crystals. I. Bismuth. KAYE AND ROBERTS. *Proc. Royal Soc.*, **104A**, 98-114(1923).—All accurate measurements of the thermal condy. of metals have heretofore been made on bars of heterogeneous structure. It was thought desirable to compare the values so obtained with the more fundamental ones given by single crystals. Expts. have been carried out in the first instance on bismuth as it is easy to obtain large crystals and it is one of the few metals that does not crys. in the cubic system. A "plate" type of thermal condy. app. was developed for the purpose. A clearly designed diagram of this app. is given and a detailed description of the construction of the hot and cold plates, the thermal insulation and the surfaces of contact. The results give the thermal conductivities of single crystals of metallic bismuth in directions parallel and perpendicular to the trigonal axis. Two very complete tables indicate these results and are so arranged that each group corresponds to one setting of the specimen. The following are the mean values at 18°C , in c.g.s. units.

| | |
|---|--------|
| Thermal conductivity of bismuth parallel to trigonal axis..... | 0.0159 |
| Thermal conductivity of bismuth perpendicular to trigonal axis..... | 0.0221 |
| Ratio of conductivities..... | 1.39 |

If a random distribution of crystals is assumed, these figures give a mean condy. of 0.0195, which agrees well with the value 0.0193 obtained on bars by JAEGER and DIESSELHORST in 1899. O. P. R. O.

Heat effects on fire clays and their mixtures. SHINJO SATOH. *Sci. Rept. Tôhoku Imp. Univ.*, **1** [3], 156-201(1923).—S. treats the problem from every angle illusg. his remarks with tables and plates. The subject is dealt with under the following headings:—(1) Thermal expansion and contraction. (2) Endothermal and exothermal reaction of raw clay. (3) Detn. of the dehydration point of clay with thermo-balance. (4) The change of the microstructure of clay by heating. (5) Erosion of clay subs. in contact with molten glass. (6) Microstructure of stone. (7) String or cord. The results are summarized as follows: (1) The firing contraction of raw mats. of fire clay is classified into 2 types, one of which expands at a comparative low temp. while the other contracts without a marked expansion. (2) Firing contraction of a fire clay mixt. is the resultant of contractions of the constituent clays. Therefore, the shape of the firing contraction curve and the amt. of the final contraction vary with the mixing ratio of the constituent clays. (3) The thermal change of length of the mold made of fire clays, when heated above a definite high temp., is irreversible. (4) When the mold of clay is htd. at a definite constant temp., the contraction curve of the length satisfies the following equation: $\frac{x}{C-x} = \frac{A}{C-A} - Kt$, where x is the amt. of contraction

at time t , A an initial length of the specimen, C the final contraction after heating infinitely long at a constant temp., and K a constant. Hence we can calculate the final contraction C by means of this equation by three observations. (5) From the results of the thermal analysis, the thermo-balance test, and the microscopic investigation, we can draw the following conclusions:—(a) The dehydration of the constitutional water of kaolinite takes place between 400°C and 600°C. (b) It seems very probable that the dissociation of kaolinite into aluminium silicate and free silica commences at 650°C. (c) The internal change takes place between 900°C and 1000°C, it is probably a polymerization of the dissociated aluminium silicate. (d) Between 1200°C and 1300°C, we have also another internal change, which may be taken as the result of recombination of free silica and aluminium silicate formerly dissociated at lower temp. (6) Stones may be classified into 4 kinds:—(a) Unfused quartz grains coming from pot material. (b) Unfused quartz grains coming from glass batch. (c) Clay subs. coming from pot mat. (d) Insol. foreign mineral coming from pot mat. as well as glass batch. (7) Some precautions for elimination of the stone in the glass, and the cause of the formation of string have been discussed.

O. P. R. O.

Graphical representation of rock analyses. J. STINY. *Centr. Mineral. Geol.*, 1923, 392-3.—Results are plotted on cross-section paper. Ordinates are %, abscissas SiO_2 , Al_2O_3 , K_2O , etc., spaced at equal intervals. Plotting starts with SiO_2 . The % of each of the remaining oxides is added to the sum of all the preceding ones and the total plotted. By joining the points so obtained, a line results which is characteristic for each rock family.

I. F. G. (C. A.)

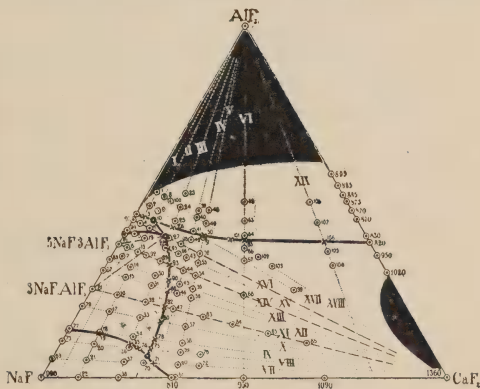
Fusibility of the ternary system: sodium fluoride, calcium fluoride, aluminium fluoride. P. P. FEDOTIEFF AND W. P. ILJINSKY. *Z. anorg. allgem. Chem.*, **129**, 93-107 (1923).—The results of the study are given in the accompanying diagram. The black portions denote the unrealizable regions. The invariant points occur at 780, 705 and 675°.

The electrical conductivity of solid and fused silicates. C. DOELTER. *Rec. trav. chim.*, **42**, 729-32(1923).—A few silicates conduct at room temp. but at 1000° nearly all silicates become conductors. Results on the condy. and polarization of fused silicates are

polarization of fused silicates are described. The detns. of polarization, especially, showed that even in the solid state electrolytic condy. is present in the silicates examd. In the fused state it is often large. From this D. concludes that ions are present even in the solid silicates but that they are firmly bound in the space lattice and for this reason the condy. does not appear until the ionic mobility is increased by raising the temp. D. has not detd. whether the condy. varies in different directions through the crystal. The existence of ions in crystals does not contradict the recent views on crystal structure.

E. J. W. (C. A.)

Experiments on the expansion of ceramic mixtures. G. CAPSA. *Bul. soc. chim. România*, 5, 5-11 (1923).—Emphasis is laid on the protracted expts. necessary to det. the influence of different ingredients and conditions during burning on the coeff. of expansion of faience.
C. C. D. (C. A.)



General

Ceramic industry in Czecho-Slovakia. RUDOLF BARTA. *Rev. Mat. Constr. Trav. Pub.*, **170**, 209-10B(1923).—I. *Raw Materials*. Percentage chem. analyses of some important raw materials and their fusion points are given.

| | SiO ₂ | Al ₂ O ₃ | Fe ₂ O ₃ | CaO | MgO | KNaO | H ₂ O | Seger cone |
|----------------------------|------------------|--------------------------------|--------------------------------|-------|------|-------|------------------|------------|
| Kaolin, Zettlitz (Sedlice) | 45.92 | 38.17 | 0.50 | 0.15 | 0.11 | 1.10 | 13.95 | (35) |
| Clay, Vilstajn | 46.35 | 33.77 | 1.11 | .. | ... | 0.33 | 13.44 | 35 |
| Clay, Mecholupy | 46.42 | 36.67 | 0.56 | .. | ... | .. | 16.68 | 35 |
| Clay, Lisany | 46.05 | 38.19 | 1.29 | .. | ... | 0.63 | 13.80 | 35 |
| Clay, Blansko | 50.03 | 35.29 | 1.57 | 0.42 | 0.49 | 0.50 | 12.05 | 34 |
| Schistose clay, Rakonitz | 52.50 | 45.22 | 0.81 | .. | ... | 0.50 | 0.78 | 36 |
| Schistose clay, Janusov | 43.38 | 42.07 | 0.80 | 0.18 | 0.20 | 0.21 | 14.25 | 37 |
| Quartzite, Bohemian | 97.79 | 1.41 | 0.13 | 0.11 | 0.19 | 0.39 | 0.25 | .. |
| Magnesite (Old Austrian) | 3.03 | 7.12 | 2.25 | 87.60 | .. | ... | .. | .. |
| Feldspar, Meclov | 63.78 | 21.41 | 0.15 | 0.12 | 0.07 | 13.70 | 0.29 | .. |

The Zettlitz kaolin contains 0.05% TiO₂. The alkali of the Meclov feldspar consists of 12.45% K₂O and 1.25% Na₂O. II. *Ceramic Products*, consist of porcelain, refractories, wall tile, paving blocks, stoneware pipe, brick, building tile, Portland cement and lime. III. *Ceramic Instruction and Technology*. Ceramics is taught in two polytechnic schools, at Prague and Brno, and in 4 indus. schools, at Bechyne, Plzen, Teplice and Znojmo. Among the scientific organizations are the Institute for silicate industries, the Institute for glass and ceramics. Standardization work is carried on by the Association for testing and exploiting of technical products. The "Société céramique tchéco-slovaque" has been lately founded at Prague and will publish its proceedings.

L. N.

The unity of English weights. SAMUEL RUSSELL. *Science*, **58** (1509), 442(1923).—The author defines the English pound of which there is but one, weighing 7000 grains. He points out that the Troy pound no longer exists. The Troy ounce, however, is in common use. There is some confusion in Amer. in the use of the fluid ounce; we ought to adopt the Brit. system in which a fluid ounce is the volume of $\frac{1}{16}$ pound of water. The author recommends that the Brit. fluid ounce shall be our "standard ounce" and that it be decimalized. The use of the so-called long ton ought also to be abolished by law.

C. J. H.

Combustion phenomena. E. KIEFT. *Combustion*, **9** [5], 390(1923).—The ht. value of a fuel is a function of its commercial value, not necessarily proportional to B.t.u., and depends also on compn., purpose and place of use. The phys.-chem. considerations of ht. transfer, combustion, and luminosity are discussed and illusd.

C. R.

The making of earthenware, up to and including the first firing of the clayware. E. SHENTON. *Pottery Gaz.*, **48**, 1789-99(1923).—Address deals with origin of clays, methods of grinding, blunging, compounding of body, throwing, turning, handling, jiggering, casting, finishing, mold making, biscuit placing and firing as in English potteries.

J. W. H.

No standard specifications for feldspar among producers and consumers. "CONSULTATION." *Eng. Mining Jour.-Press*, **114**, 1077(1922).—"Producers and consumers may have agreements that serve in lieu of standard requirements but they are a matter of individual negotiation rather than universal trade recognition" S. L. G.

Industrial analysis. ANON. *Eng. Mining Jour.-Press*, **113**, 81-97(1922).—Discusses production and markets for manganese, chromite, nickel, tungsten, molybdenum,

vanadium, uranium, radium, arsenic, barytes, bauxite and aluminum, borax, fluorspar, graphite, magnesite, talc and mica. S. L. G.

The non-metallic minerals. WARREN M. FOOTE. *Eng. Mining Jour.-Press*, **113**, 242-6(1922).—Review 1921 production of pumice, asbestos, graphite, limestone, pyrite, talc, clay, silica, bauxite, fluorspar, magnesite, chalk, sulfur, emery, gypsum, barytes, borax, phosphate rock and mica. S. L. G.

Future of non-metallic minerals. R. B. LADOO. *Eng. Mining Jour.-Press*, **113**, 146-7(1922).—Brief analysis of conditions and tendencies in mining, milling, etc. S. L. G.

Status of pulverized fuel. L. W. W. MORROW. *Elec. World*, **82**, 525-32(1923).—Advantages of the use of pulverized fuel in central stations include decreased losses and greater flexibility in operation. However, it cannot be assumed that its use is advantageous in all cases. Several installations are discussed and illus. Concrete bins allow longer storage than steel. For best results, 65% of the coal should pass 200-mesh, and it should contain less than 5% moisture. Below this figure, driers are unnecessary but if used tend to prevent clogging of the conveyors and consumption of more power in handling. W. H. B. (C. A.)

BOOK REVIEW

The Chemistry and Physics of Clays and Other Ceramic Materials. By A. B SEARLE. 1924. 695 pages. Ernest Benn, Ltd., Publishers, 8 Bouverie St., E. C. 4, London, England. Price, 55 shillings, net.

A clear and concise text covering the physical and chemical laws controlling the behavior of clays and all other ceramic and related materials. Also an excellent collection of data on the physical and chemical properties of the materials employed in ceramic manufacture and of other minerals and materials for which the ceramist would have an interest.

The data is presented in table form in nearly all cases and represents a very thorough search of scientific literature presented in a convenient form for use in the factory or laboratory.

The title of the volume fails to indicate that it contains a very large amount of data on the physical and chemical properties of burned ceramic products. This data is among the most valuable of the book's contents.

The book has the further advantages of an excellent table of contents and index which will commend it to many as a reference volume.

The material presented is in chapter form and may be briefly described as follows:

1. Physical Structure.—A brief treatise on crystalline and amorphous solids, pastes, slips, colloids and states of aggregation encountered in ceramic materials. Also mode of occurrence of ceramic materials and methods of reduction.

2. Properties Depending on Structure.—Shape and proportioning of grain size and influence on the product; methods of test, and influence and control of homogeneity, porosity and texture in the product.

3. Color, Hardness and Minor Physical Properties.—Natural and artificial sources of color in clays and the causes of discoloration; hardness, and its determination; effect of temperature on hardness of the product.

4. Strength and Allied Properties.—Forms of strength and factors affecting strength in raw and burned clays and bodies with data and test methods.

5. Specific Gravity and Density.—Explanation of the factors affecting these properties in ceramic bodies with test data.

6. Changes in Physical State Effected by Water.—General discussion of clay-water mixtures and their properties, including colloidal phenomena and the causes and measurement of plasticity.

7. Changes in Physical State Following the Removal of Water.—A brief presentation of the theory of drying of clays.

8. Chemical Constitution of Ceramic Materials.—The elements, laws of chemical combination and multiple proportions, atomic and molecular weights, valency, modes of expression, constitution of ceramic materials.

9. The Chemical Components of Ceramic Materials and Products.—Sampling, interpretation of analysis, impurities in clays and effect of composition on utility, general description of types of clay and types of ceramic ware with chemicals and percentage compositions, the Seger cones 022 to 42, various methods of expressing refractoriness, the chemical formulas of engobes and glazes of all types with methods of control and adjustment, and chemical compositions of all the important refractories.

10. The Mineralogical Composition of Ceramic Materials Including the Clays and Related and Associated Minerals.

11. Physical.—Chemical Reactions between Ceramic Materials.—The nature and type of chemical reactions and the influencing factors with explanation of equilibrium diagrams and description of physico-chemical processes.

12. Heat and Temperature.—Their measurements, thermal capacity, heat transmission, and heat and temperature measuring apparatus.

13. The Effect of Heat on Ceramic Materials.—During drying and burning, with finishing temperatures of different types of ceramic ware, the properties of the burned products, and a table of melting points of ceramic materials.

14. Electrical and Magnetic Properties of Ceramic Materials.—Data on electrical conductivity and specific resistance and the effect of composition on the electrical and magnetic properties of ceramic bodies.

15. Optical Properties of Ceramic Materials.—Description and data regarding refractive indices, birefringence and other optical properties of ceramic materials and manufactured ceramic wares.

ARTHUR S. WATTS

CERAMIC ABSTRACTS

Compiled by the
AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the Editor of *Chemical Abstracts* by cooperative agreement.

Abrasives

Abrasives. Statistics, 1919-1921. ANON. *Imperial Min. Res. Bur., Min. Ind. Brit. Empire and Foreign Countries* (1924).—This report gives: world's production, summary of exports and imports of abrasives, details of imports and exports of the United Kingdom, Union of South Africa, Canada, Hong Kong, Australia, New Zealand, France, Germany, Greece, Switzerland, and the United States, concluding with a bibliography. O. P. R. O.

The marundites and allied corundum-bearing rocks in the Leysdorp district of the eastern Transvaal. A. L. HALL. *Trans. Geol. Soc. S. Africa*, **25**, 43-67(1923).—Marundites are rocks consisting essentially of margarite and corundum (whence the name) forming small vertical intrusives up to a few yards thick in pyroxenite, peridotite, and serpentine. Marundite may pass into plumasite (andesine-corundum-anorthosite) within the same rock body. Abnormal marundites are characterized by cyanite, Cr-mica, and a granular ruby-colored mica; but this type is known *in situ* at but one locality. The marundites are regarded as having been derived from quartz-feldspar pegmatites intrusive in magnesium rocks through the gradual removal of SiO_2 leading ultimately to a magma supersatd. with Al_2O_3 , which sepd. out as corundum. The relative amt. of SiO_2 removed detcs. whether plumastite or marundite is formed, and this is believed due to pneumatolytic conditions. These changes may occur *in situ* or prior to intrusion. The abnormal cyanite type probably arose under similar genetic conditions, perhaps prior to intrusion, and disturbed by the assimilation of accidental xenoliths. Analyses are given of margarite, marundites and plumasites. Cf. *Ceram. Abs.*, **1** [12], 317(1922). S. G. G. (C. A.)

PATENTS

Sand-paper, emery cloth, etc. MINNESOTA MINING AND MANUFACTURING CO. Brit. 194,274, Feb. 6, 1923. Waterproof sand-paper, emery cloth, or like material, comprises a base upon which the abrasive powder is secured by a non-hygroscopic cement or binder. The binder is in the form of a varnish prepd. from linseed oil or china wood oil and a gum, *e. g.*, kauri, copal, or dammar, and to which a drying agent, *e. g.*, Mn borate, is added. To accelerate the drying, and to improve the adhesive properties of the binder, electrolytic process white lead, known as "Dowdy white," is added; a paste drier, *e. g.*, $\text{Pb}(\text{OAc})_2$ and resinate of Mn also may be employed. When a more fluid binder is required, a japan drier is used, *e. g.*, "schrack japan." In prep. the varnish, the oil is boiled until it nearly reaches a solid state, and the varnish may comprise 3 parts of gum dammar with two parts of linseed oil. Castor oil may be incorporated with the varnish when the drying action is required to be retarded. After completion of the abrasive sheet, the base may be thinned down to give greater flexibility. The binder is applied under pressure. (C. A.)

Homogeneous crystalline products. H. A. RICHMOND and R. MACDONALD, JR. Can. 234,502, Sept. 25, 1923. A refractory, insulating and abrasive product characterized by great hardness, solidity, resistance to fracture and fine crystn. is composed of oxides of B, Al, Si, Fe and Ti fused together. (C. A.)

Art

Decorative painting on glass. MAURICE DE KEGHEL. *Rev. prod. chim.*, **26**, 645-8, 721-4, 759-60(1923).—A general discussion of the glasses, colors and especially of the vehicles suitable for painting on glass. A. P.-C. (C. A.)

Cement, Lime and Plaster

A new rapid hardening slag cement. R. M. *Rev. Mat. Constr. Trav. Pub.*, **172**, 1-4(1924).—A slag cement "Louve" having rapid hardening properties has been per-

fectured by Pierre Prévost in France. Chem. analysis in wt. %: SiO_2 (uncombined) 1.2, SiO_2 (combined) 24.2, Al_2O_3 13.8, Fe_2O_3 1.6, CaO 46.3, MgO 2.4, SO_3 0.9, undetd. 9.6. The "hydraulic index" is 0.83; fineness of grinding, residue on 80-mesh screen (900 mesh per sq. cm.) 1%, residue on 180-mesh screen (4900 mesh per sq. cm.) 10%; apparent d. 0.880. The cement sets slowly, beginning 5 hours after tempering, and ending 8 and 15 hours later. The following are results of tests made for comparison between the "Louve" cement and the prevailing cements acceptable according to the specifications of the city of Paris.

TENSILE STRENGTH (KGS. PER SQ. CM.)

| | 24 h. | 2 d. | 7 d. | 28 d. | 3 m. | 6 m. |
|-----------------|-------|------|------|-------|------|------|
| Neat Cement | | | | | | |
| "Louve" cement | 17 | 24 | 29.7 | 32 | 36.5 | 40 |
| Av. slag cement | .. | 7 | 20 | 26 | 28 | 30 |
| Dry Mortar 1:3 | | | | | | |
| "Louve" cement | 13 | 18.6 | 27.5 | 31.3 | 34.5 | 35 |
| Av. slag cement | .. | 6 | 16 | 25 | 29 | 32 |

CRUSHING STRENGTH (KGS. PER SQ. CM.)

(1) Compn. 150 kgs. cement, 1 cu. m. gravel (20-40 mm.), $\frac{1}{2}$ cu. m. sand

| | 18 h. | 24 h. | 48 h. | 7 d. |
|---------------------|-------|-------|-------|------|
| "Louve" cement | 3 | 5.2 | 18.5 | 27.5 |
| Av. slag cement | .. | 2.7 | 4.2 | 21.9 |
| Av. Portland cement | .. | ... | 9.0 | 21 |

(2) Compn. 350 kgs. cement, 1 cu. m. gravel (5-20 mm.), $\frac{1}{2}$ cu. m. sand

| | 18 h. | 24 h. | 48 h. | 7 d. |
|-----------------|-------|-------|-------|------|
| "Louve" cement | 7.9 | 9.7 | 18.8 | 38 |
| Av. slag cement | 3.2 | 4.2 | 6.2 | 25 |

By the use of a rapid hardening cement road-work is accessible to traffic in a short period of time.

L. N.

Magnesium oxy-chlorides, their properties and uses in the construction field. M. Y. SEATON. *Tr. Am. Inst. Chem. Eng.*, **14**, 305-19(1922).—Magnesium oxychlorides, discovered by Sorel in 1867, have become an important structural binding material for compn. floors, wall stuccos, special molds for castings, etc. These bodies are made by treating with a dil. soln. of MgCl_2 , a mixt. of MgO and an aggregate composed of fine sand, ground silica or marble, and a fibrous mat. such as asbestos or wood fiber. When applied to walls or floors they dry quickly to light and strong bodies which are sanitary, dustless and resistant to wear. The MgCl_2 comes chiefly from the salt brines of Michigan. The magnesium oxide used is made by calcining magnesite, obtained from the California and Washington deposits. Calcining in rotary kilns, with temp. carefully controlled at around 1100°C is the best practice. The plastic calcined oxide is ground to give 85% through 200-mesh. Increased demand in the future may be satisfied by plastic MgO made from dolomite. The sand used should be clean, and finer than concrete sand. The prepn. of the mixes is rather complicated and demands careful control so that it is not ordinarily practicable to prep. them at the point of use. The bodies will withstand water provided there is proper drainage, with no stagnant water in contact with them for long periods. Cf. *Ceram. Abs.*, **2** [7], 147(1923).

B. M. L.

Gypsum. F. A. WILDER. *Mineral Ind.*, **31**, 354-60(1922).—The output of gypsum products and their value in 1922 was the greatest in history. The use of gypsum for land plaster, partitions, roofs, floors and plaster board is increasing. Many new

groups and trade affiliations appeared during the year. The use of rotary calciners of the Port. cement type was an outstanding feature. Ball mill grinding is becoming more common in connection with rotary kilns. In the Emley process, plaster of Paris is ground in ball mills, thereby driving out the chem. water. Recombining in the mill makes hard wall plaster denser and more plastic. Ready cut steel frame houses covered inside and outside with plaster board, and the floors and roofs made of gypsum are being erected in Canada. Outside bearing wall in another type of construction are being made of gypsum tile. Cf. *Ceram. Abs.*, **1** [6], 160(1922); *ibid.*, **1** [3], 91(1922). T. N. McV.

The energy of crystallization of burned gypsum. M. VON GLASENAPP. *Z. anorg. allgem. Chem.*, **130**, 246-52(1923).—The setting of gypsum is due to recrystallization as the dihydrate, following soln. of the hemihydrate. The resulting change in structure is illustrated by photomicrographs of the original and regenerated gypsum; the latter is composed of much finer crystals, is harder and more porous. Setting in water vapor only produces similar effects, with even finer crystals. (Cf. *Ceram. Abs.*, **2** [11], 239 (1923). B. H. C. (C. A.)

The scientific investigation of cement. RICHARD GRÜN. *Beton u. Eisen*, **22**, 281-3(1923).—An historical review and illustrated description of the new German institute for cement research. C. C. D. (C. A.)

Fused cement. A. TROCHE. *Beton u. Eisen*, **22**, 271-6(1923).—The properties of the recently developed high temp. cement (elec. cement, ciment fondu, etc.) are described, with extensive data (cf. *C. A.*, **15**, 583; **16**, 1845; 3374; **17**, 195, 619, 3739, 3409). C. C. D. (C. A.)

Bibliography of magnesian cements. G. H. WEST, R. L. SEBASTIAN AND W. A. DARROW. Bur. of Mines, *Repts. of Investigations*, No. **2534**, 17 pp.(1923).—211 titles. E. J. C. (C. A.)

Fused cement, electric cement, or aluminous cement. CH. BERTIN. *Bull. soc. ind. Rouen*, **51**, 339-43(1923).—Brief description of fused cement (invented by Bied) and of its merits, the chief of which are rapid setting and hardening (forms can be safely removed after 12 hrs.), high tensile and compressive strengths, and resistance to the action of sea water and sulfates. A. P.-C. (C. A.)

Lime in 1922. G. F. LOUGHLIN AND A. T. COONS. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 195-206(preprint No. 23, publ. Dec. 1, 1923). E. J. C. (C. A.)

Gypsum in 1922. K. W. COTTRELL. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 133-9(preprint No. 16, publ. Oct. 18, 1923). E. J. C. (C. A.)

Enamel

PATENTS

Red cupriferous pigment for iron enamel. R. T. HANSEN. Danish 30,646, Nov. 13, 1922. A mixt. of CuSO_4 soln., tin-putty and gum arabic with a diminutive addn. of AuCl_3 or cinnabar. (C. A.)

Operating muffle furnaces. F. G. ROBERTS. U. S. 1,472,401, Oct. 30. Muffles such as those used in firing enamel ware are kept continuously up to working temp. by simultaneously heating both the interior and exterior of the muffle. (C. A.)

Glass

The estimation of selenium in glass. A. COUSEN. *Jour. Soc. Glass Tech.*, **7** [28], 303(1923).—A modification of Frankel's process. J. G. P.

The production of colorless glass in tank furnaces with special reference to the use of selenium. II. A. COUSEN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **7**

[28], 309(1923); for Part I see *Ceram. Abs.*, **1** [5], 94(1923).—A very large number of small scale meltings were made in further elucidation of the behavior of selenium and sodium selenite during the decolorizing of glasses prepd. either from batches contg. soda only, or with small additions of salt cake, sodium nitrate, borax, or arsenious oxide. With batches contg. soda ash only, $\frac{1}{2}$ oz. of selenium per 1000 lb. of sand is more than sufficient to decolorize glass which contains only .04 to .06% of iron oxide, the glass becoming yellow as a result of the selenium excess. The presence of sodium nitrate does not prevent the liberation of selenium in glasses prepd. from batches contg. this salt, and they are colored much more intensely yellow or brown than soda ash glasses under corresponding conditions. The development of a yellow or brown color in glasses contg. selenium or sodium selenite is dependent on the time of heating as well as on the amount of selenium present. With glasses prepd. from soda ash batches or containing sodium nitrate, the yellow color deepens to brown when the glass is maintained for a period of hours at temps. between 1380°C and 1300°C. In batches containing salt cake, however, the color changes from yellow or pink to green, owing to the very small amt. of selenium retained in these batches and to the natural increase of iron oxide content as the glass stands in contact with the fire clay. A small amt. of borax equivalent to the yield of 1% of B_2O_3 in the glass was found to be without effect either on the amt. of selenium retained or upon the color of the glass as compared with pure soda ash batches only. Arsenious oxide in the propn. of 1.5 parts to 1000 of sand prevented the yellowish brown color due to selenium, even when an excessive amt. of the latter was added, and even when the glass was maintained for a considerable period at 1380–1300°C. Arsenious oxide is the only substance so far discovered which makes easy the decolorizing of selenium-contg. glasses and gives stability to the conditions. Analysis of the glasses for selenium showed that the greater part is lost by volatilization, a commercial glass only retaining 23% of that added. Batches which contain sodium nitrate being more readily fusible, retain considerably more selenium than those which produce glasses more slowly. The amt. of selenium actually needed for the operation of decolorizing appears to be exceedingly small. From indications so far obtained, it would appear that the selenium added to a batch does not become oxidized to selenite, but remains as selenium, its color only being developed slowly as the result of continued htg.

J. G. P.

The refractive index changes in optical glasses occasioned by chilling and tempering. F. TWYMAN AND F. SIMEON. *Jour. Soc. Glass Tech.*, **7** [28], 262(1923).—A discussion.

J. G. P.

Opaque and colored glasses and ceramic glazes of the same nature. ALBERT GRANGER. *Jour. Soc. Glass Tech.*, **7** [28], 291(1923).—A discussion in which the author demonstrates that the old purely chem. conceptions which have been applied to glass and to glazes are totally insufficient. One must accept the idea of a soln. in many of those cases wherein one formerly allowed the intervention of a compd., the actual existence of which was doubtful from the observed facts.

J. G. P.

Pyrex glass as a material for chemical plant construction. A. E. MARSHALL. *Trans. Amer. Inst. Chem. Eng.*, **14**, 329–43(1922).—An outline of the development of Pyrex glass for large-scale plant equipment is included. The cleanliness, ease of inspection and observation, and resistivity to corrosion of glass equipment gives it many advantages wherever it is possible to use it. Pyrex has a very low expansion coeff., and a softening point of about 800°C. Denitrating towers, large evapg. dishes and retorts, tubing, high-tension insulators, etc., are among the articles made successfully from Pyrex glass.

B. M. L.

Glass rings. A new filling material for towers. F. C. ZEISBERG. *Trans. Amer. Inst. Chem. Eng.*, **14**, 321–7(1922).—Hollow cylinders or rings have been shown to be

very efficient for packing towers. They are now being made of stoneware but the smallest sizes practicable using such material are bigger than desirable for many uses. Small metal rings now made present such a large surface that any chemical reaction with the liquids and gases present results in rather severe corrosion of the metal. The DuPont Co. has developed glass rings for packing to the point of fairly cheap quantity production. These can be made as small as necessary, give good service for certain purposes and are easily cleaned. Properties and tentative prices for the sizes made are given.

B. M. L.

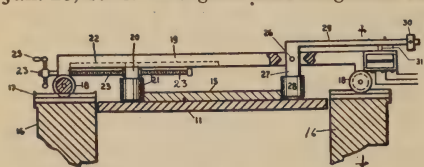
Heat economy in the glass industry. ANON. *Arch. Wärmewirtschaft*, **4**, 159-60 (1923).—A description of the diagnosis of typical cases of fuel squandering in glass works. The causes were: air leaks into regenerative chambers; excessive steam in the producers; too low a fuel bed in the producers; leaky reversing valves; too little draft in the producers; too infrequent clinkering.

E. W. T. (C. A.)

Simple and accurate method for determining surface tension and density of molten glass. EDW. W. WASHBURN. *Proc. Am. Phys. Soc.*, **1922**; *Phys. Rev.*, **20**, 94-5 (1922).—The surface tension of molten glass is detd. from the positions of a Pt cylinder suspended by a sensitive spring free in air and after raising a small pot of molten glass so that the surface of the glass makes contact with the cylinder. The cylinder is standardized before and after each detn. by similar measurements with liquids of known surface tension. The d. is detd. with the same app. but with a Pt sphere substituted in place of the Pt cylinder. The surface tension of the soda-lime-silica glasses between 1200° and 1450° is of the order of magnitude of 150 dynes per cm. D. MACR. (C. A.)

PATENTS

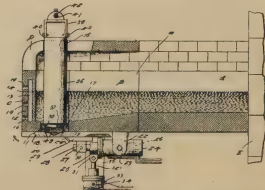
Glass machinery. CLARENCE W. AVERY and WENZEL G. VESEY. U. S. 1,482,106, Jan. 29, 1924. In a glass width regulator for glass strip forming machinery having a moving platform with strip forming members



associated therewith, a frame adapted to be moved transversely of the line of movement of the platform by a strip formed on the platform, an adjustable stop on said frame and a movable stop on said frame whereby the strip passing between

the stops may cause the frame to vary its position relative to the platform, the adjustable stop may determine the width of the strip formed on the platform, and the movable stop may be actuated by variations in the width of the strip to vary the speed of the platform.

Glass-delivering apparatus. JOHN W. CARNAHAN. U. S. 1,481,688, Jan. 22, 1924. The combination with a glass fur. snout having a discharge opening, of a knife cutting off the glass discharge through the opening, and means for shifting the knife transversely across the opening and then lowering the knife away from the discharge opening and returning it to its initial position. The combination with a glass fur. snout having a discharge opening in its bottom, of an annular bushing of refrac. mat. disposed in said discharge opening and through which the glass passes, a metallic plate in the bottom of the snout having an outwardly and downwardly flared opening larger than the opening of the bushing, means for cooling said plate, a vertically shiftable plug disposed within the snout and having its lower end reduced to form a portion fitting the lower end of the bushing, a shoulder above said bushing adapted, when the plug is lowered, to rest on the bushing and cut off the flow of glass therethrough, the lower end



of the plug having the form of an inverted cone, and a knife disposed against the metallic plate and reciprocable across the axis of the opening therethrough and below the conical lower end of the plug when the latter is lowered to thereby cut off the thread of glass depending from the extremity of the plug when the plug is lowered.

Ornamenting glass, etc. G. L. HUYSMANS. Brit. 199,802, March 28, 1922. Raised designs or inscriptions are produced on glass, pottery, etc., by the application of a plastic compn. consisting of finely powd. metals, such as Cu, Al and Mg, mixed with an emulsion of CaCO_3 , a thick soln. of mucilage such as Senegal gum, copal, $\text{Al}_2(\text{SO}_4)_3$ and coal tar or drying oil. The compn. hardens without high temp. baking. A suitable method of applying the compn. is by extrusion app. The leads of stained glass may be imitated by this process. (C. A.)

Bottles; silvering. H. FERGUSON. Brit. 200,448, Jan. 25, 1923. A bottle is made in the shape of a revolver or pistol and the inner surface is coated with Ag, etc., by the "formaldehyde" or other known process. The muzzle forms the neck of the bottle and may receive a cork or stopper. In the method of coating described, 3 aq. solns. are poured into the bottle in turn, the first consisting of cryst. AgNO_3 and NH_3 , the second of HCHO , and the third of 1 part by vol. of the first soln. with 2 parts of the second. The coating is then washed with distd. H_2O . (C. A.)

Glass manufacture. CORNING GLASS WORKS. Brit. 194,888, Feb. 7, 1922. A decolorizer for use with borosilicate glasses consists of Nd_2O_3 . About 0.5 to 1% of the decolorizer is added to the batch to neutralize the yellow green tint of the glass due to the presence of Fe. The product commercially known as "didymium oxide," which is a mixt. of Nd_2O_3 and La oxide, is used. The amt. of Nd_2O_3 may be increased to 5% if it is desired to produce a pink color in the glass. (C. A.)

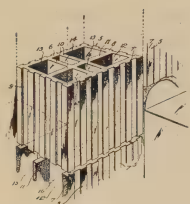
Glass manufacture. CORNING GLASS WORKS. Brit. 195,495, Feb. 7, 1922. A process of making translucent or opaque glass consists in melting a batch contg. boric oxide, a relatively high % of SiO_2 , and a chloride, bromide, or sulfate. Preferably, the boric oxide content of the batch is not less than the alkali content, and the SiO_2 is over 70% of the ingredients other than the chloride, bromide, or sulfate. In practice, 1 to 5 parts of a chloride, bromide, or sulfate, preferably of an alkali metal, are added to 100 parts of a suitable foundation glass, or its batch. The compns. of a no. of suitable foundation glasses are given in the specification. (C. A.)

Heavy Clay Products

British test road. ANON. *Roads and Road Construction* (London), 1, 395(1924).—An appeal has been made for a test road in England such as has been constructed in various places in America. The proposal is to make a mile of road using 8 types of foundation and 8 types of surface finish and it will be tested to destruction by the continuous running of loaded motor lorries over it. The results would produce facts for the highway engineer to embody into his specif. which would be of untold value and mean great economy in construction work, in as far as it would show how to avoid mistakes. O. P. R. O.

PATENT

Hollow building tile. EDWIN J. BEINECKE. U. S. 1,481,249, Jan. 22, 1924. A wall structure, comprising superimposed courses of cellular tiles having front, back and side outer walls, inner walls extending from front to back, and from side to side, forming front and back passages in said tiles, the front passages being of less area than the back passages, the opposite ends of the tile of one course lying in substantially parallel planes, the upper ends of the tile of an adjacent course having a front reduced portion, the front and back outer walls of the several courses of tile being arranged in alignment with each



other, the inner front and back connecting walls of one course of tile being arranged in staggered relation to the corresponding walls of a vertically adjacent course, and a facing composed of courses of stringer bricks and an intermediate course of header bricks, the inner ends of the header bricks overlapping the reduced portion of the upper end of one course of tile and being bonded therewith on the upper end of the front wall of said tile and on an innerside connecting wall parallel therewith.

Porous ceramic material. E. C. BAYER. Danish 29,386, Feb. 20, 1922. Ferruginous plastic clay is heated above its sintering point, pulverized, mixed with moist plastic clay, molded and burned. (C. A.)

Refractories

Alumina and bauxite. R. J. ANDERSON. *Mineral Ind.*, **31**, 8-37(1922).—An article on statistics and changes in technology and uses of alumina for 1922. Diaspore and high alumina clays have nearly taken the place of bauxite for refractories. Large amts. of these clays are being mined in Missouri. Low grade bauxite is used in France for alumina cements. The Everhart process for washing bauxite clays in the presence of small amts. of peptizers has possibilities. Richmond and McDonald obtain a very pure abrasive by melting bauxite in an elec. fur. and reducing impurities with carbon. Quantity production of sillimanite has been started. The use of ZrO_2 —10% Al_2O_3 for steel furnaces has been examined. Several new methods for producing K and Al sulphates from feldspars and shales have been proposed. T. N. McV.

Graphite. B. L. MILLER. *Mineral Ind.*, **31**, 347-53(1922).—The graphite industry was almost stagnant in 1922. Wartime stocks have not been exhausted. Prices were lower than in 1922. A British patent contains new features. Natural graphite is purified from silica, alumina, pyrite and mica by intimate mixing with coal, charcoal or coke. The mixt. is elec. heated to approx. $2200^\circ C$. The coal unites with impurities which are volatilized and collected. Silica is used for filtering or polishing powder, the SO_3 for mfg. H_2SO_4 and metallic oxides for met. purposes. T. N. McV.

Magnesite. S. H. DOLBEAR. *Mineral Ind.*, **31**, 451-6(1922).—There was an increase of production of 32% in 1922. Imports were $3\frac{1}{3}$ times those of 1921. Practically all domestic production came from Calif. and was used in the chem. industries and for mfg. of magnesite cement. Most of the imported mat. came from the Austrian mines. This article gives tables of imports and domestic production. T. N. McV.

Electric furnace phenomena. E. T. MOORE. *Assoc. of Iron and Steel Elec. Engrs.*, **5**, 529-82(1923).—M., in a lengthy paper, discusses the work of the Electric Furnace Committee of the Assoc. of Iron and Steel Elec. Engrs. and presents report of this committee for 1923. Research has been designed to include work along the following lines: (1) a thorough study of the heat losses from elec. furs.; (2) presentation of operating data on fur. electrodes according to the electrode specs. drawn up by the committee and presented in the 1920 report; (3) an investg. of the merits of dual voltages, and the deleterious effect on the metal, if any, of a relatively high voltage for melting; and (4) investg. of elec.-fur. phenomena. These lines of tests have not been completed with the exception of (3), and work is still in progress. The tests were carried out on a stand. 6-T. Heroult fur. at the works of the Holcomb Steel Co., Syracuse, N. Y., and alloy steels were melted. Much of the data presented are of no interest to ceramists, but certain of the main conclusions arrived at may be summarized as follows: (1) The amt. of unbalancing between phases in an individual fur. is considerable, as shown by oscillograms and graphic meter charts, and the max. difference noted is 340 kw. or 21% of the connected load. This is not of such magnitude as to affect operations. (2) The max.

current values reached during the melting period is 1.1 times normal. (3) Arcs in a fur. set up high frequency disturbances; these are of the order of 5,000 cycles. (4) The power factor was 90% for the melting period and 88% for the refining period, and 89% for the entire heat. (5) The burning out of the back wall in a furnace or the burning of the refractory anywhere within the fur, is a function of the power introduced into the fur, and the distance which the arcs are from such refracs. Burning out of refracs. can be regulated by proper spacing of the electrodes so as to increase the distance of the arcs from the refrac. walls. By closer concn. of the electrodes, the connected capacity can be increased, thus giving a faster melting fur. (6) The limiting capacity of elec. furs. (by which is meant the largest amt. of power that can be introduced into a fur.) varies with the actual size of the fur.; a 25-T. furnace with a connected capacity of 4,500 kva., on a 25-cycle circuit, is about as large as should be installed when melting is done and where only one set of electrodes is used. For hot metal work, a fur. of 40-T. capacity with a connected load of 3,300 kva. is very satisfactory using one set of electrodes of 24-in. diam. In 60-cycle circuits where melting is done, using only one set of electrodes, furs. beyond 15 T. are not recommended, but for hot-metal work a fur. of 40-T. capacity is satisfactory. By using more than one set of electrodes, it is possible to build a fur. of several hundred T. capacity. (7) There seems to be an impression that 60-cycle arcs have less cutting action on the refracs. than 25-cycle arcs, but this cannot be substantiated. (8) It has been claimed that higher temps. can be obtained in 60-cycle furs. than in 25-cycle furs., but this cannot be substantiated. The type and resistance of the current-carrying mat. determines this. (9) With a bath of steel liquid in the fur., the power cannot be safely interrupted for longer than three-quarters of an hr. R. J. A.

Graphites for brass melting crucibles. ANON. *Metal Industry* (New York), 22, 59(1924).—Discussion of report from Bureau of Mines recommending American graphites. Based on interview with Jonathan Bartley. Gives compositions of alloys used and results of tests by R. T. Stull and L. E. Geyer, denoting that Alabama graphite bonded with American clays gave superior service. Sharp disagreement with this conclusion by two crucible manufacturers led to investigation of research work done by Bureau. Results were obtained only up to 13.1 heats per crucible when a crucible should give from 30–40 heats before being considered commercial. It was found that mats. were assembled in 1918 and crucibles were not ready till December of that year. After the Armistice no effort was made to hasten work and the last of the crucibles were not tested till fall of 1922. During at least part of the period from 1918–1922 good Ceylon or Madagascar graphite could not be obtained and the Alabama graphite was therefore tested against very low grades. Thus, the Bureau results are hardly conclusive and the use of American bond clays is more a matter of indiv. preference and local conditions.

R. J. A.

Technical literature on refractories. P. L. M. *Rev. Mat. Constr. Trav. Pub.*, 164, 93–4B; 165, 116–8B; 166, 137–9B; 167, 152–5B; 168, 177–9B; 169, 196–7B; 170, 215–8B; 171, 237–9B(1923).—The subject matter and references have been taken mainly from English and American literature. In some cases the references only are given, in others the text and data are also quoted. The information is gathered under the following headings: (1) (a) Tests of refrac. (b) Slagging tests of refrac. (c) Usefulness of standard methods for detg. thermal cond. of refrac. materials. (d) Bibliography on thermal condy. of refractories. (2) (a) Reversible dilatation of refrac. (b) Alumina refrac. (c) Magnesite and dolomite refrac. (d) Zirconia refrac. (e) English (American) methods of testing refrac. products. These cover chem. analysis, porosity, shrinkage, compression strength, fusion tests, coeff. of expansion. (3) (a) Chrome refrac. (b) Burning life of refrac. (c) Amer. specif. standards for glass refrac.

L. N.

Natural sillimanite as a glass refractory material. S. ENGLISH. *Jour. Soc. Glass Tech.*, 7 [28], 258(1923).—A discussion. J. G. P.

Graphite in Western Australia. WILSON. *Chem. Eng. & Min. Rev.*, 16, 101 (1924).—A report on the Mattigallup deposit of graphite by Wilson, Ass't State Mining Engineer. The graphite occurs in flat, shallow, undulating beds of kaolin or clay, in seams varying from 6 to 24 in. wide, which do not appear to be continuous for any great distance. In the No. 1 shaft a bulge seems to have occurred, there being 8 ft. of lode showing. The surface rock consists of hard ironstone laterite in which graphite can be seen in places, and at the bottom of the deeper shafts the country rock, which consists of kaolin, seems to lose its bedded character and may possibly represent the weathered portion of a more or less basic rock. While of low grade and too small for work on a large scale, W. calls attention to the comparatively low grade mines being worked in Canada by dry concn., and by flotation units and electrostatic separators, and recommends some exptl. work on these lines. The Mines Department is now considering giving financial assistance in the development work under the mining development act. O. P. R. O.

The effect of salt coal upon refractory materials. L. M. WILSON. *Colliery Guardian*, 126, 906-7(1923).—Expts. analogous to those of Clewes and Thompson (cf. *C. A.*, 16 3821) on the effect of NaCl on SiO₂ are described in which the effect of NH₄Cl on refrac. materials was studied. The results show the superiority of high-grade SiO₂ over fire clay for the lining of coke ovens in its resistance to salty coal. The amt. of Al₂O₃ removed from fire clay increased with the temp. 900-10° was a *crit. temp.* below which very little Al₂O₃ was removed and above which a large amt. was removed. No crit. temp. was found for high SiO₂ brick. Fe is also removed by NH₄Cl from bricks at high temps. Comparative expts. with Pt and Si boats showed that free SiO₂ aids the removal of Al₂O₃ from fire clay exposed to NH₄Cl at high temps. Al₂O₃ reacted in some way with the SiO₂ below the m. p. of either, thus confirming the observation of Cobb (cf. *C. A.*, 4, 1658) of the interaction of solids at temps. below the m. p. of either. C. C. D. (*C. A.*)

The silica-brick works of the Consett Iron Co. ANON. *Colliery Guardian*, 126, 1163-4(1923).—An illustrated description of the Consett Iron Co. brickworks. The products contain approx. 30% tridymite and only a trace of unconverted quartz, insuring absence of permanent or after-expansion. Expansion is nearly complete at approx. 600°; none occurs at 1000-1400°; and above 1400° a slight contraction takes place. C. C. D. (*C. A.*)

PATENTS

Graphite crucible. RYUTARO KONISHI. Japan. 41,935, Mar. 8, 1922. The resistance to oxidation and to heat of a graphite crucible is increased by coating the outside first with a mixt. of 70 parts of carborundum, 30 parts of a special porcelain clay and 30 parts of H₂O, and then with a mixt. of 70 parts of a glaze (*e. g.*, made of 45 parts of feldspar, 18 parts of CaO, 10 parts of clay and 27 parts of SiO₂), 30 parts of carborundum and 100 parts of H₂O. (*C. A.*)

Refractory abrasive compositions. L. E. BOURDEAU. Brit. 200,903, April 19, 1922. A mixt. consisting chiefly of bauxite and basalt is fused with smaller proportions of ilmenite, cerite, C, and a flux such as Na fluosilicate. Substance such as emery, corundum, flint, and quartz may also be added. The product may be colored by the addn. of suitable oxides so as to indicate its degree of hardness. (*C. A.*)

Silica bricks. PEASE & PARTNERS, LTD. and J. WILSON. Brit. 193,999, Dec. 8, 1921. Small proportions of china clay and lime are added to Dinas stone, ganister, or other material used in making silica bricks. Preferred proportions are 96% of silica, 2½% of china clay and 1½% of lime. The china clay and lime are suspended in the water with which the powd. silica is rendered plastic. (*C. A.*)

Dolomite bricks. T. HODSON, J. HODSON, W. HODSON and T. A. HODSON. Brit. 193,576, Dec. 17, 1921. Refractory basic bricks, furnace linings, retorts, etc., are obtained by calcining dolomite, magnesite, or magnesian limestone, adding small quantities (about 15%) of igneous rocks, other than granites and syenites, and in some cases a little basic Fe ore, mixing with H_2O , molding, and firing at $2,000^\circ$. Suitable igneous rocks are the peridotites (including diorite and gabbro), the dolerites (including basalts), the serpentines, trachytes, andesites, tachylytes, eurites and rhyolites. If rocks of the last two classes are employed, or if the dolomite contains more than 1% of SiO_2 or 57% of $CaCO_3$, it is necessary to add 3% of basic iron ore, such as titanite iron ore, magnetite, hematite, or gothite. (C. A.)

Refractory article and method of making the same. WILLIAM A. HARTY. U. S. 1,473,853, Jan. 22, 1924. A refractory article containing fire clay and fused silica.

Terra Cotta

The unique development of modern chemical stoneware. P. C. KINGSBURY. *Trans. Amer. Inst. Chem. Eng.*, **14**, 275-92(1922).—A very good gen. discussion of the industry is given, with illustrations of products. Process efficiency in much of chemical industry is dependent on varied stoneware shapes adapted to special uses. Most of these have been developed only in the past 20 years. Chemical stoneware is essentially a framework of more or less refractory particles held together by vitrifying clays. Fineness, density and refractoriness of bodies are varied, depending upon the use for the products. The bond clays used must vitrify at the kiln temp., and fuse only at a considerably higher temp., so there will be no softening of shapes in the kiln. It must have high plasticity and strength in the green state, to make possible the production of complicated shapes. Mixtures of various clays are used, which are washed and mixed, and before using are stored in blocks for two years in a satd. atmosphere, which increases the plasticity. Most shapes must be dried very slowly in a carefully controlled atmosphere to prevent deformation in bodies which have from 6-12% linear shrinkage. Burning is carried to about $1300^\circ C$, requiring up to 3 weeks in the largest kilns. Stoneware resists the action of all acids but hydrofluoric acid and strong, hot phosphoric acid. Caustic alkali solns. have slight action upon it when hot and concd. Filter presses, large rotary driers, exhaust fans, pumps, condensation coils, complete equipment for muriatic acid plants, etc., are among the newer products made from stoneware.

B. M. L.

Whiteware

Note books of Josiah Wedgwood. B. MOORE AND J. W. MELLOR. *Trans. Ceram. Soc. (Eng.)*, **22**, 275-82(1923).—For abstract see 2 [7], 142(1923). H. F. S.

The crazing of English earthenware. A. HEATH. *Trans. Ceram. Soc. (Eng.)*, **2**, 213-40(1923).—The common practice of the English earthenware manufacturer has been confined to the use of a certain type of body, which matures at a fairly low biscuit temp., and a glaze which, in general, gives good results at a still lower temp. If the body mats. are controlled by the use of definite chem. and phys. tests, little trouble is experienced, but if, through lack of control, any variation in the compn. of these mats. is ignored, the "balance" of the body with the glaze is upset, and trouble is encountered. The work contd. in this paper expresses the limit of variation in the compn. of a body in relation to crazing and peeling with a given glaze. H. F. S.

Porcelain. S. SCHERTEL. *Mikrokosmos*, **16**, 214-5(1923).—A popular description is given of the use of feldspar, kaolin and quartz in the manuf. of porcelain. Photomicrographs are shown of feldspar and porcelain after heating to different temps. near the m. p. L. W. R. (C. A.)

Shock tester for porcelain insulators. W. BUCKSATH. *Elektrotechn. Z.*, **44**, 943-7, 975-80(1923).
C. G. F. (C. A.)

Equipment and Apparatus

A new electric radiation furnace. A. PAOLINI. *Giorn. Chem. Ind. ed App.*, **5**, 539(1923).—This fur. is designed for operation from 1400–1500°C and is planned for burning of ceramic products. A resistor of graphite (99% C) is used and a refrac. withstanding 2000°C. Radiation channels are used coming into the fur. from the carbon resistor in cone shapes thus giving a greater radiating surface. Various types of terminals are shown and discussed. The furnace operates on 150 kw. A tunnel car type is used also. The furnace is possible for use in metallurgical practice, production of refractories, porcelains, by-product coke, calcination of dolomite, cements, sodium sulphide and sodium aluminate from bauxite.
S. S. C.

Notes on the application of pyrometers to ceramic industries. C. E. FOSTER. *Trans. Ceram. Soc.*, **22**, 248-74.—The matter of elec. resistance of the circuit is of fundamental importance. It is necessary that the resistance of the circuit should remain approx. constant with changes in temp. in any part of the circuit, in order that, for any given temp. of the "hot junction," the current flowing in the circuit (and consequently the reading of the indicator) shall be approx. the same as when the instrument was calibrated. A large propn. of the total instrument resistance shall be of mat. which does not change appreciably with change in temp. It is not essential that the total resistance should be high, but only that the propn. of ballast resistance should be high. To make a base metal pyrometer of low total resistance and yet capable of accurate measurement, it is only necessary that the propn. of ballast resistance shall be large enough, and there is no essential need for a high total resistance. The cases where it is necessary to use rare metals in industrial work are only relatively few. Clockwork is the usual device employed for running the recorder mechanism, and there should be a large margin of power to allow the instrument to continue running under adverse conditions. The resistance thermometer, operating by the change in resistance of a coil of fine wire which is put in the place of the "hot junction" of the thermocouple, requires an outside source of current; it does not produce its own e. m. f. It depends upon the balancing of the varying resistance of this coil of wire, known as the "bulb," against other resistances in the instrument. The resistance thermometer should not be used industrially at temps. where distortion is likely to occur, and, therefore, it is not a type of much interest to the ceramic industry. Considerable progress has been made in the application of radiation pyrometers to high temp. measurement. In the case of a pyrometer which operates by the total range of ht. radiations, both short visible and long invisible wave-lengths, known as a "total radiation" instrument, the ht. radiated from the hot body under measurement is concentrated upon some device sensitive to heat, for instance, a very small thermocouple. The instrument then operates in the same manner as an inserted thermocouple. An optical pyrometer is one in which the visible brightness of the hot body is measured or extinguished. In the extinction type, the hot body is viewed through an absorbing medium, the thickness of which is increased until the observer considers that he can no longer see the hot body. Such an instrument requires to be used with the knowledge that the sensibility of the eye depends on the length of time it has been in the dark. The other type depends upon the matching of the brightness of the hot body against that of a source of light carried with the instrument. Here the personal element is much less, exposure of the eye to a bright light will only decrease the closeness of the match and will not alter the position on the temp. scale. One great advantage of the optical pyrometer is that it can be used at much greater working distances, and on much smaller hot bodies, than the total radiation type.

H. F. S.

Modern electrical pyrometry. DAVID BROWNLIE. *Chem. Trade Jour.*, **73** [1892], 213-6(1923).—This is a general and not too technical description of the types of elec. pyrometers used, with several applications on boiler practice. The limits of the glass mercurial thermometer are indicated as between 900° and 1000°F for intermittent work, and below that for permanent work. Elec. pyrometry is divided into two classes, thermoelec. and elec. resistant pyrometry. The thermoelec. pyrometers are further classified as base metal and platinum-rhodium pyrometers. The base metal pyrometers are described and several alloys are mentioned as used for the "pointers" or thermoelements. The platinum-rhodium, or Le Chatelier couple, is described and a general theory of the development of current shown. Diagrams and some pictures of English pyrometers are shown, giving the method of indicating or recording the temp. as it affects the elec. current produced. The elec. resistance pyrometer is described and it is just shown for use at distances greater than permissible with the thermoelec. It is useful also at extremely low temperatures, but it is limited at the higher range. Two installations on boilers are described in detail and the advantage of recording instruments is shown. A brief mention is made of the elec. radiation pyrometer, which is a special application of the thermoelec. pyrometer. F. C. F.

PATENT

Electrical resistance. S. KATALAIN. Brit. 197,340, May 7, 1923. An elec. resistance mat. which does not fuse or oxidize at high temps. is composed of various ferro alloys, ferro silicon, ferro tungsten, ferro molybdenum, ferro titanium, ferro chromate, etc., mixed with fire clay, magnesite, etc. These are mixed, kneaded and heated to 1500-1600°. W. M. C.

Kilns, Furnaces, Fuels and Combustion

Some new forms of kilns. A. DUCKHAM. *Trans. Ceram. Soc. (Eng.)*, **22**, 298-312 (1923).—A kiln of the continuous type, 16 chambers in all, is described. The chambers are arranged in two lines, with wickets on the outside only. There are 4 fire-holes and bags to each chamber, the arrangement of firing being that generally known as semi-gaseous. A. W. D. Central Bag Kiln is discussed. Its advantages are: even heating; bag forms no portion of the kiln proper, can be made of different mat., and can be easily renewed; proper combustion of the heating gases; the brickwork forming the kiln proper is never subjected to the direct action of the heating gases during combustion. The advantages of a tunnel kiln are: saving of labor, fuel, and heating and cooling of the materials. The disadvantages are: mechanical, the great length of the tunnel, the tendency of the htg. gases to rise, and so cause uneven burning. See also *Ceram. Abs.*, **2** [3], 45(1923). H. F. S.

PATENTS

Brick kiln. YASABURO SAITO. Japan. 42,989, June 30, 1922. This is a parallel ring kiln with two main flues between two burning channels instead of one as usual. Each main flue is connected with the opposite burning channel by small flues which pass under the other. It has a drying chamber on the main flues. Another drying tunnel is constructed around the kiln. Pipes are imbedded in the kiln body over the crown. Hot air produced in them by conduction is utilized in drying bricks by connecting the pipes with the drying chamber and tunnel. (C. A.)

Improvement in kiln for burning brick and similar wares. TOKUSABURO SATO. Japan. 42,666, May 20, 1922. The kiln is provided with fire-boxes, each of which has a drop-arch and a channel-shaped wall at its rear. The drop-arch directs the flame produced on the grate downward. The flame then strikes the inverted-channel wall, which is a kind of very low flash wall, situated much nearer to the grate than usual.

The construction keeps the furnace end hot and aids the complete combustion of gases.
(C. A.)

Geology

The geology of the Bournemouth District. HENRY DEWEY. *Trans. Ceram. Soc.*, **22**, 293-7(1924).—The area dealt with extends from Wareham eastwards to Christchurch, and northward from the Isle of Purbeck to Wimborne. Attention is called to those formations which possess the greatest interest to the English Ceramic Society.

H. F. S.

China clay statistics 1919-1921. ANON. *Imperial Mineral Res. Bureau, Min. Ind. Brit. Empire and Foreign Countries*(1924).—China clay statistics for 1919-1921. Introductory note gives different systems used by various countries for computing imports and exports; the annual av. rates of exchange; and states that the British statute ton, 2,240 lb. avdp. (the long ton) is used throughout the rept. The world's production of china clay is given; summary of exports; summary of imports; details of exports and imports for United Kingdom, Canada, India, Czechoslovakia, Denmark, France, Germany, Italy, Sweden, Switzerland and United States are given. The reports conclude with a brief statistical bibliography.

O. P. R. O.

Fluorspar statistics, 1919-1921. ANON. *Imperial Mineral Res. Bur., Min. Ind. Brit. Empire and Foreign Countries*(1924).—Different systems used by various countries for computing imports and exports are given in an introductory note, also the average rates of exchange. The long ton (the British statute ton of 2,240 lb.) is used throughout the report. World's production of fluorspar is given; summary of exports and of imports; details of imports and exports for United Kingdom, Canada, Sweden, and the United States are given; also with a list of statistical publications.

O. P. R. O.

Kaolin mining, Victoria. ANON. *Chem. Eng. and Mining Rev.* (Melbourne, Victoria), **16**, 100(1923).—Kaolin mining is being actively carried on at Egerton and Gordon. In a crosscut of a new shaft, the deposit of pipe clay is 6 ft. wide, and of very good quality.

O. P. R. O.

PATENTS

Pottery. J. E. TAMS. Brit. 198,607, Sept. 16, 1922. A transparent body similar to china, feldspar, or Parian consists of powd. asbestos and powd. frit produced from powd. asbestos and soda fretted in the usual way and ground. China clay, feldspar, or stone may be added.

(C. A.)

Pottery materials. W. GREEN. Brit. 198,817, March 18, 1922. A ceramic material is made by incorporating hard porcelain ingredients contg. potash, etc., with a sintered irreducible oxide such as pure alumina or zirconia of a high m. p. The compn. is fired at a high temp. to produce a hard tough product having a low elec. condy. and a low porosity. The compn. may consist of alumina, potash, feldspar, china clay, and ground flint. Cores which resist the action of liquid of gaseous Hg may be made from the compn.

(C. A.)

Fluorite-chillagoe (Victoria). E. C. SAINT-SMITH. *Chem. Eng. and Mining Rev.* (Melbourne, Victoria), **16**, 94(1923).—S. estimates 9,000 T. of high-grade fluorite available at a mining cost of 10 s. per T. with probably a much greater tonnage available below water level. The estimate cost delivered at the port of Cairns is 43s. Analysis of an av. sample from one of the surface outcrops gave 96.74% of calcium fluoride, and 1.12% of calcium carbonate.

O. P. R. O.

Preparation of amorphous silica, free from alkali. J. MICHAEL AND CO. Ger. 348,769 (Berlin), (*Oil & Color Trade Jour.*, **65**, 40(1924)).—Precipitated silica, washed

with water or acids, is treated with a metallic salt, especially of the alkaline earths, magnesium or aluminium and then washed again in the usual manner. O. P. R. O.

Note on Quartz from Kragerø, Norway. J. C. JØRGENSEN. *Tidsskrift for kemi og bergvesen*, **3**, 164(1923).—Pre-Cambrian quartzite forming thick benches and occurring in large deposits contains 98–99% SiO_2 . The chief impurity is muscovite. The content of Fe is .14–.17%. The annual production from one quarry located on an island has reached 15,000 T. The quartz is used in the manuf. of ferrosilicon and to some extent in ceramics. O. A.

Silica in 1922. F. J. KATZ. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 183–6(preprint No. 21, publ. Nov. 27, 1923). E. J. C. (C. A.)

Talc and soapstone in 1922. EDWARD SAMPSON. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 81–6(preprint No. 13, publ. Oct. 11, 1923). E. J. C. (C. A.)

Clay in 1922. JEFFERSON MIDDLETON. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 73–80(preprint No. 12, publ. Oct. 10, 1923).—For clay in 1921 see *Ceram. Abs.*, **2** [6], 139(1923). E. J. C. (C. A.)

Chemistry and Physics

Borax. A. T. WARD. *Mineral Ind.*, **31**, 80–83(1922).—Borax ($\text{Na}_2\text{B}_4\text{O}_7$) is produced by refining ulexite ($\text{NaCaB}_5\text{O}_9 \cdot 8\text{H}_2\text{O}$) and by treating colemanite ($\text{Ca}_2\text{B}_6\text{O}_{11} \cdot 5\text{H}_2\text{O}$) with Na_2CO_3 and Na_2SO_4 . Other crude borax minerals of commercial importance are sassolite (from Italy); pandermite (from Asia Minor) and tincal (from Tibet). Borax may be obtained from howlite ($4\text{CaO} \cdot 5\text{B}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 5\text{H}_2\text{O}$). The Oregon borax mineral priceite ($5\text{CaO} \cdot 6\text{B}_2\text{O}_3 \cdot 9\text{H}_2\text{O}$) is identical with pandermite. Most of boric acid is prepd. by chem. treatment of colemanite. Half of the borax produced in this country or 20,000 metric tons is used in the pottery and enamel industries. All borax produced is from the western part of the U. S. T. N. McV.

Alumina manufactured from clay. H. PEDERSEN. *Tidsskrift for kemi og bergvesen*, **3**, 161–4, 175–8(1923); **4**, 11–17(1924).—The articles describe processes arrived at through extensive exptl. work. The raw mats. were clay, coal and sulphuric acid (chamber acid). The clay is an ordinary brick clay from quaternary deposits and has the following average compn.: SiO_2 55.0, Al_2O_3 16.0, FeO 7.0, MgO 0.7, CaO 1.0, Na_2O 2.5, K_2O 3.5. The process is approx. as follows: (1) The clay is kneaded and mixed with cold chamber acid, the heat of reaction raising the temp. of the mixt. to 150°C whereby SiO_2 is obtained in an amorphous state and is easily filtered. The mixt. is stored for 12 hours. (2) The dissolved clay is leached out systematically three times. The slimes are removed in filter presses. The brine obtained has a sp. gr. 1.35 and contains about 80 g. Al_2O_3 per l. solution. (3) The brine is cooled to about 15°C , this pptg. about $\frac{1}{3}$ of the Al_2O_3 as potassium alum formed by the reaction between H_2SO_4 and the Al_2O_3 and K_2O of the clay. The remaining $\frac{2}{3}$ of Al_2O_3 is pptd. by adding to the cold, stirred liquid solid K_2SO_4 obtained from previous production. (4) The raw alum is recrystallized with as little water as possible, a pure alum contg. less than 0.01% Fe being obtained. No filtration is necessary. (5) The pure alum is dried in a gas heated rotary kiln. (6) The dried alum is decomposed in a gas heated rotary kiln in slightly reducing atm. The product consists of Al_2O_3 and K_2SO_4 , while the H_2SO_4 originally combined with Al_2O_3 escapes as a gas contg. about 6 vol. % SO_2 . (7) The decomposed alum is heated with a cold-satd. soln. of K_2SO_4 , the contents of K_2SO_4 thereby being obtained in a warm-satd. soln., which on cooling yields crystd. K_2SO_4 . Al_2O_3 is removed from the hot soln. by filtration. The cold-satd. K_2SO_4 circulates in the process. (8) Al_2O_3 is dried at $300\text{--}400^\circ\text{C}$ for removal of hygroscopic water. (There is

little loss from dusting contrary to what is the case with the hydrate.)—For 1 ton of Al_2O_3 the following amounts of raw mats. are used: Clay 12 tons (at kr. 1.50), coal 2.5 tons (at kr. 15.00), chamber acid 20 tons (at kr. 25.00). A recovery of 400 kg. pure K_2SO_4 (at kr. 0.25) per ton Al_2O_3 is figured on.—In some introductory paragraphs P. compares different methods and criticizes a method suggested by V. M. Goldschmidt for producing Al_2O_3 from labradorite, stating especially that labradorite yields only 19.5% soluble Al_2O_3 , while Goldschmidt claims up to about 30%. O. A.

The solubility of alumina minerals in acids. V. M. GOLDSCHMIDT. *Tidsskrift for kemi og bergvesen*, 4, 9(1924).—A rejoinder to the criticism contd. in the articles of H. Pedersen abstracted above. G. has found that *unaltered* labradorite yields from 20 to 32% Al_2O_3 soluble in HNO_3 , while labradorite only partly changed to "saussurite" may be nearly insoluble. Saussurite is a mixt. of zoisite-clinzoisite ($\text{H}_2\text{O} \cdot 4\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$) and a lime-soda feldspar rich in soda ($x\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 + y\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$). G. suggests that the discrepancies may be due to a difference in the labradorite used in the experiments, Pedersen probably having used a somewhat "saussuritized" labradorite. O. A.

Investigations on Norwegian clays. I. J. v. KROGH. *Norges Geol. Undersokelse*, 115, 1–32(1923).—Some of the more important properties of quaternary clays used in ordinary brick making have been detd. The amt. of H_2O at "normal consistency" varies between 22 and 39%. The drying shrinkage is given with figures between 1 and 11%. The grain size varies widely, the finest clay contg. upwards of 82% of particles smaller than 0.01 mm. and only 0.1% larger than 0.1 mm., while a sandy variety contains 4.6% smaller than 0.01 mm. and 58.3% larger than 0.1 mm. Numerous determinations of softening temperatures gave results between 1050° and 1225°C. Clays fired at 900°C have water absorption between 9.84 and 24.72%, porosity between 21.8 and 37.8%, and sp. gr. between 2.20 and 2.606. O. A.

Investigations on Norwegian clays. II. B. DIETRICHSON. *Norges Geol. Undersokelse*, 116, 1–58(1923).—A brief outline of the geology of quaternary (marine) clays of southern Norway is given. Samples collected at brick works are described, details of the geology of the places of collection being given in a number of instances. Sketches and photographs accompany the descriptions. O. A.

Investigations on Norwegian clays. III. J. v. KROGH. *Norges Geol. Undersokelse*, 119, 1–56(1924).—K. describes expts. on quaternary clays and presents the results in tables and diagrams. The limit of satn. (*i. e.*, contents of water in a clay showing incipient flowage) is detd. on 75 samples with results varying from 12.8 to 72.8% (of dry subs.). The max. press. to which clays of varying water contents may be exposed without flowing are considerably higher for fat clays than for lean ones, the difference increasing with decreasing amount of water. The drying shrinkage is detd. on a large number of different clays using of each clay a number of samples with gradually increasing initial water up to the point of flowage. The results calculated as means for 5 groups of fatness are presented in curves where shrinkage is plotted against initial water. A similar series of detns. is made of the water absorption of clays fired at 900°C. A fired clay attains a min. water absorption at a definite initial amt. of water in the wet clay. This amt. varies somewhat in the different groups of fatness, the average being about 24%. An average temp.-porosity curve shows a maximum porosity at about 800°C, all curves declining abruptly at about 1000°C. The molding pressure has only a small influence on the porosity of the fired clay. Curves of crushing strength plotted against temp. of firing show characteristic features. All the curves have secondary maxima at about 500°C and secondary minima at about 700°C. Actual tests seem to show that an industrial production of bricks fired at only 500°C may be possible. Expulsion of water by pressure is facilitated by rapidly increasing pressures or sharp

concussions on the vessel contg. the clay. The plasticity, defined as the difference between the amt. of water in the clay at the limit of satn. and at normal consistency, varies between 5 and 40 for all the varieties examd. The plasticity-temp. curves decline slowly to 400°C, then rapidly to about 500°C, and again slowly to about 900°C; clay fired at this temp. is practically devoid of plasticity. O. A.

The microscopic structure of clays. LEON BERTRAND. *Recherch. et Invent.*, **4**, 825, 842(1923).—On examn. of 250 secondary French clays B. found an appreciable amt. of mica in only 3 or 4. He concludes that the alkali content usually occurs uncombined, being adsorbed by the clay colloid. He found iron most often present as a hydrated oxide. The free silica particles vary greatly as to size. One clay contained 17% hydrated silica, making it less refractory than a clay with the same amt. of coarse quartz. B. found the clay base itself to be composed of colloids, cryst. kaolinite, as found in kaolin, and cryptocryst. mat., especially abundant in halloysite. Most clays without the addn. of feldspar show granular sillimanite when fired to 1300°, and its formation is almost independent of any fluxes present. Interlacing needles of sillimanite, however, may not develop below 1600°, and a vitreous structure seems necessary for its formation. A high flux content will lower the latter temp., but all fluxes do not act the same. B. contends that the quality of paving brick is largely detd. by the amt. of these needles. P. W. K.

The industrial applications of the electric furnace. E. W. LEWIS. *Engineering* (London), **116**, 257-9(1923).—The charac. of the elec. fur. are const. and regular ht. distribution and accurate automatic control of the temp. The two types of elec. fur. generally used are the induction and arc or modifications of these two types. A. c. is used in indus. applications. The principal uses are: (1) Smelting of iron ores; (2) manuf. of steel; (3) fixation of atmospheric nitrogen and ammonia oxidation; (4) heat treatment in the automobile industry; (5) manuf. of CaC_2 ; (6) in the annealing of glass, the elec. fur. is rapidly supplanting the fuel-fired fur., due to the accurate control of temp., uniformity of the ht. application and the even distribution of the ht. In the manuf. of fused silica ware silica is heated in an elec. fur. to its m. p. (1800°C). W. E. R.

Determination of melting points. WM. JONES. *Fuels and Furnaces*, **1**, 455-60 (1923).—The detn. of the m. p. or f. p. of a substance is based on the fact that the temp. of the mass remains const. during the transition from the solid to the liquid phase, or vice versa. From a time-temp. curve the m. p. is obtained. From a time-e. m. f. curve for pure substances of known m. p. thermocouples may be calibrated. W. E. R.

The determination of the calorific value of liquid fuels. NELSON HARWOOD. *Engineering* (London), **116**, 396(1923).—By means of an adjustable mercury column acting on a reservoir liquid fuel is delivered to a suitable burner at const. pressure. The fuel is burned at a const. rate in a gas calorimeter of the Junker type. After temp. equil. is attained in the instrument the calorific value is calcd. from the amt. of fuel burned and the quantity of ht. delivered to water circulating through the calorimeter. W. E. R.

The laws of heat transfer. ANON. *Engineering* (London), **116**, 1-3, 69-70, 131-2, 228-30(1923).—Deductions from exptl. data published by G. C. Webster and others. The resist. to the transfer of heat between a tube and a fluid traversing it, in normal turbulent flow, must consist of two terms one of which is independent of the thermal condy. of the fluid while the other term includes this condy. as a factor. The first term is Reynold's convective resist. which is a modification of the proportion $R = v/F$, in which R denotes resist. to transfer of heat, in C. G. S. units, v denotes mean velocity of flow in cm. per sec., and F is the frictional resist. experienced by the fluid per unit area of wall surface in dynes per sq. cm. The second term is the film resist. A con-

siderable fraction of the resist. to heat transfer between a tube and a fluid traversing it is to be ascribed to the existence of a film of the fluid which creeps along the walls in a state of viscous flow. At temperatures above 80°C air contd. in water will be given off, breaking up this film and changing the law of heat transfer. The actual thickness of this film is expressed as a fraction of a mathematically deduced ideal film thickness. The thermal resist. of the film per sq. cm., $R_f = \varphi f_1/c$, in which f_1 denotes the thickness of the ideal film, φ is the ratio of the actual film thickness (f) to the ideal film thickness, and c is the sp. condy. of the fluid. Exptl. evidence indicates that φ is a const. and equal to 0.55. The ratio of the ideal film thickness to the radius of the tube is expressed by the formula $f_1/a = 1 - \sqrt[3]{1 - 8\bar{\mu}v/dF}$ where a denotes the radius of the tube, $\bar{\mu}$ is the mean viscosity of the film, and d denotes the diam. of the pipe. By this equation the film thickness is always a finite quantity however large v or d may be. By substitution, $R_f = 0.55d/2c(1 - \sqrt[3]{1 - 8\bar{\mu}v/dF})$. The total resist., R , to the transfer of heat is given by $R = R_r + R_f$. R_r is the modification of the convective resist. formula: $R_r = (1 - \varphi)v/F$. The total resist. then is $R = 0.45v/F + 0.55d/2c(1 - \sqrt[3]{1 - 8\bar{\mu}v/dF})$. When the greatest thickness of the film is less than $1/100$ of the radius its condy. can be calcd. as if it were flat. In ordinary condenser practice the film may be as much as $1/20$ of the radius in which case its resist. would be about $2^{1/2}\%$ more than if it were flat. $Q = \Delta T/R$, where Q is the heat flow in cal. per sq. cm. per sec. and ΔT is the difference between temp. of the inner surface of the tube and the mean water temp. If R is known under given conditions for a tube of internal diameter d , at corresponding speeds and with the same water and wall temperatures the resist. of a corresponding tube of internal diameter D is found by multiplying the known resist. by D/d . For fluids other than water the formula should read $R = 0.45/s \times v/F + 0.55d/2c(1 - \sqrt[3]{1 - 8\bar{\mu}v/dF})$, where s is the sp. heat of the fluid traversing the pipe.

W. E. R.

The stresses in cylindrical and spherical bodies due to differences of temp. inside and out. CHAS. H. LEES. *Trans. Ceram. Soc.*, 22 [3], 241-7(1923).—A hollow cylinder of circular section, originally at air temp. throughout, is heated till its outside surface is at 1000°C. To find the stresses in the material, its expansion and its elastic constants were given. In all cases considered the stresses in the mat. were due to the rise or fall of the temp. of the mat. from some uniform to some non-uniform distribution, and the values given are for the stresses which exist in the non-uniform condition.

H. F. S.

Sodium-aluminium fluoride practically free from silica. HUMANN & TEISLER CHEMISCHE FABRIK DOHNA. Ger. 348,274 (*Oil and Color Trade Jour.*, 65, 226 (1923)).—The amt. of sodium salt needed for the formation of the double fluoride is gradually added and stirred into the warm reaction liquid. 1 kg. of kaolin, suspended in water, is dissolved in 4 kg. of 40% hydrofluoric acid, the soln. being decanted from the sediment and treated with 620 gr. of carbonate of soda. A ppt. of 1 kg. of the double fluoride (dry substance) is thrown down, while the silicic acid of the kaolin remains in soln. as hydrofluosilicic acid.

O. P. R. O.

Electrical conductivity in the zeolites. O. WEIGEL. *Z. Krist. Festband P. v. Groth*, 58, 183-202(1923).—The purpose of this investigation was to det. whether the H_2O in zeolites is present as mols. or ions; it is shown to exist, in part at least, as ions. By using dry metallic electrodes and a quartz fiber electrometer the condy. of several zeolites was detd. The sp. resistance (cm. ohm) was found to be: stilbite, 2 to 5×10^8 ; heulandite, 4 to 8×10^{10} ; chabazite, 2 to 3×10^8 ; natrolite, 1.5 to 1.6×10^{12} ; apophyllite, 1.7×10^{13} ; analcite, 6×10^9 . This resistance is low for non-metallic minerals, and is due to the at least partially ionized H_2O content, and not to the cations. This was demonstrated in 2 ways: (1) partial dehydration greatly increased the resistivity of heulandite; (2) substitution of H_2O electrodes notably decreased the resistivity of

several zeolites. The condy. is closely dependent on temp.; for heulandite the sp. resistivity was halved by a rise of 8° in temp. (from 16° to 24°). E. F. H. (C. A.)

Specific heats of gases. C. DE LA CONDAMINE. *Chaleur et ind.*, **4**, 64(1923); *J. Soc. Glass Tech.*, **7**, 118; cf. C. A., **17**, 2042.—The sp. heat of gases at const. pressure varies only slightly with the pressure. Thus for air over a temp. range of 27 – 77° Lussana found a variation of only 0.0015 per 1 atm. change, while at 60° Holborn and Jakob gave a variation of 0.0003 per atm. Lussana found for CO_2 a change of sp. heat at const. pressure of only 0.002 per 1 atm. change, a variation of only 0.9%. Theoretically it could be shown that $dC_p/dp = 2aA/RT^2$, so that the variations of the sp. pressures would be less at higher temps. A table and curves for finding the heat required to raise 1 kg. of steam, air and other gases over varying temp. ranges at varying pressures were given. C. H. H., JR. (C. A.)

PATENT

Aluminates. J. KORITSCHONER and F. HANSRIG. Brit. 199,017, May 30, 1923. Aluminiferous materials such as bauxite are mixed with alk.-earth compds. such as lime and with C in certain proportions and fused in an elec. or other furnace. The product is cooled and powdered, and is leached with a soln. of an alkali such as Na_2CO_3 to obtain alkali aluminate. The leaching may be effected at 100° . The proportion of Al_2O_3 to CaO may be 47.5 to 52.5 and the quantities given in an example are 64.9 parts bauxite, 36.9 parts lime, and 10 parts charcoal. It is stated that metallurgical processes, especially the production of Fe in blast or elec. furnaces, may be carried on so that the slag contains lime and Al_2O_3 in the above propns. so that the Al_2O_3 may be extd. from the slag as above described. (C. A.)

General

The distillization of bituminous limestones for the production of mineral oils. LA REDAZIONE. *Giorn. Chem. Ind. ed Applic.*, **5**, 537(1923).—This is a review of the work being carried on by various organizations in Italy for the removing of asphalt oils from limestone. The large deposits occur in Sicily where it is calculated are 320,000,000 T. of rock. A use of the burned rock is being investigated. S. S. C.

Bituminous limestones of Abruzzo and the possible utilization of the distillates. D. MENEGHINI. *Giorn. Chem. Ind. ed Applic.*, **5**, 545(1923).—This rock varies from 5–15% volatiles and about 1–2.5% S. The temperatures of distillation are from 350 – 375°C . The products formed are ammonia, CO_2 , benzol, asphalt oil and tar. Methods of determining S in the oil are discussed and results of per cent of S obtained by various methods are given. The amt. of S in oil varies from 6.8–10.4%. S. S. C.

Non-metallics in 1923. N. B. DAVIS. *Can. Min. Jour.*, **44** [1], 19(1924).—A brief review is given of the developments in production and uses of important non-metallic minerals during the year in Canada. B. M. L.

Saskatchewan's place in Canadian ceramics. W. G. WORCESTER. *Can. Min. Jour.*, **44** [1], 25(1924).—The Univ. of Sask. has included the first and only ceramic engineering course in Canada in its curriculum. Work has been started with Gov't coöperation in the survey of ceramic resources and the testing of clays of Sask. Among the known and tested clays are those suitable for pottery and light ware, for heavy clay products, and for refractories, indicating very diversified clay resources. Pottery, sewer-pipe, building brick, and refractories are now manufactured. Fuel resources are now limited to very large lignite coal deposits and some natural gas. Water supplies and transportation are satisfactory. B. M. L.

Mining in 1923. ANON. *Eng. & Min. Jour.-Press*, **117** [3], 87, 93–7(1924).—Interesting, brief comments are included on the 1923 developments in the production,

imports, exports and prices of asbestos, bauxite, borax, diatomite, feldspar, fluorspar, kaolin, magnesite, mica, silica, talc, etc. B. M. L.

Conservation of heat in power and heating systems. E. R. WEIDLEIN. *Trans. Am. Inst. Chem. Eng.*, **13** [2], 25-42(1921).—The article includes the results obtained up to 1920 at the Mellon Institute in the study of the properties of "85% magnesia" as a heat insulating covering for steam pipes, etc. Good heat insulators usually owe their value essentially to the presence of a large volume of dead air spaces entrapped in a porous mat. "85% magnesia" contains 90% of voids. It is made by mixing 85 parts of pure basic carbonate ($4\text{MgCO}_3 \cdot \text{Mg}(\text{OH})_2 \cdot 5\text{H}_2\text{O}$), made by a chem. process from dolomite, with 15% of asbestos fiber, molded to shape, dried 5-6 days, and planed to accurate sizes. The mat. absorbs about 3 times its own wt. of water. Repeated wettings and dryings do not materially affect its properties. Some blocks of the mat. were found to have increased 3% in insulating value after 16-20 years' service. Saturation with oil, however, caused permanent damage to the insulating efficiency. Coverings were used up to 800°F and were in perfect condition after 4 yrs. of service. Ordinarily pipes will rust less rapidly when covered than when bare. Tables and curves are included which show costs of insulation, savings in heat, coal and money, etc. A method is outlined for calcg. the most economical amt. of insulation. B. M. L.

Effective B. t. u. and cost determine value of coal. A. BEMENT. *Power*, **58** [12], 448-50(1923).—The calorimetric B. t. u. value of coals as determined in a lab. does not always give true practical comparisons; the calorimeter process is perfect whereas practical usage of the coal is often very imperfect. A term known as "effective B. t. u." has been devised. It is by this term that coals should be compared rather than by the lab. B. t. u. A simple method of obtaining the effective B. t. u. is given. Emphasis is laid on the fact that oftentimes the cost of coal at the mines is compared, whereas cost at the point of delivery is what should have been used in the comparison. Examples are given showing that good coal will often pay for itself because less draft is needed, resulting in a lower necessary grate area and possibly fewer boilers. Poor coal means greater losses resulting from less efficient combustion because of coke and coal with the ash and higher stack temps. C. J. H.

Fuel oil and viscosity. M. G. LAUGHAM. *Power*, **58** [11], 423-4(1923).—The purchase of fuel oil was for many years made without any specifics. Later a gravity reading was introduced because it was, in general, an indication of the ease of atomization. With the advent of heavy crudes from the Southwest, gravity readings have become less reliable because of the difficulty of reading them and also because suspended water affects the accuracy. Since the ease of burning is generally dependent upon the fluidity of the oil to the burner, this important characteristic or its reciprocal, viscosity, must be considered. Temp.-viscosity curves show that different fuel oils must be heated over a wide range of temperatures in order to produce similar viscosity characteristics. Also oils of nearly the same gravity should not necessarily be heated to the same temp. in order to be of the same viscosity. Improper viscosity may result in inefficient burner operation. One of the leading burner manufacturers recommends a viscosity of 8° Engler for best operation of his burner. An important point is that the viscosities of certain Mexican oils change under certain conditions of storage depending upon the storage temp. The viscosity does not always change instantly with temp. The capacity of the oil heater depends to a large extent upon the viscosity of the oils passing through it. A great deal could be done to decrease the annual waste if engineers would give closer attention to the phys. characteristics of viscosity. C. J. H.

Oil shale in Tasmania. ANON. *Chem. Eng. and Mining Rev.* (Melbourne, Victoria), **16**, 102(1923).—The shale is finely laminated, brown in color, sectile, tough and resistant to weathering agencies. It is capable of being converted into petroleum prod-

ucts by destructive distillation, samples tested give from 46 to 64 gal. of oil to the ton. In the retorting opern. there are 3 products; crude benzine: kerosene and light lubricating oils; and heavy lubricating oils; this is claimed to be a new departure. The oil shale exists in large quantities, a conservative estimate of the tonnage in 3 leases (totaling 1488 A.), on Mersey River, near Latrobe, has been made at 5,580,000 T.

O. P. R. O.

Australian Chemical Institute. DAVID MASSON. *Chem. Eng. and Mining Rev.* (Melbourne, Victoria), **16**, 103(1923).—At a general meeting held in Sydney, David Masson, first president, announced the incorporation of Australian Chem. Inst. as at Sept. 17, 1923; the first annual meeting to be held in Nov., 1924.

O. P. R. O.

Oil sands (South Australia). W. A. HARGREAVES. *Chem. Eng. and Mining Rev.* (Melbourne, Victoria), **16**, 116(1923).—Analysis of the oil film issuing from the bore, at a depth of 1,110 ft., where a 3 ft. belt of oil sand was reported, shows: bitumen 17.6%; mineral oil 74.3%, saponifiable oil 8.1%.

O. P. R. O.

The influence of ceramics on the development of the chemical industry. FELIX SINGER. *Chem.-Ztg.*, **47**, 450-1(1923).

E. J. C. (C. A.)

PATENT

Purifying clay. W. FELDENHEIMER and W. W. PLOWMAN. Brit. 199,795, March 27, 1922. A process for the purification of clay comprizes peptization of the clay in an aq. soln. of caustic alkali, such as NaOH, which contains the hydroxide of an alk.-earth such as Ca, Ba, or Sr, the amt. of reagents added for suspending any given clay being varied according to the hardness of the water used. The soln. of mixed hydrates may be obtained by the interaction of an excess of caustic alkali and an alk.-earth hypochlorite such as bleaching powder in the presence of H₂O. The suspension of clay may be sepd. from the unpeptized impurities, when such are present, and the clay recovered in any desired manner. A sol. hypochlorite may also be present in the liquid for bleaching, deodorizing and sterilizing the clay, in which case a longer period of contact is usually necessary, or the hypochlorite may be added to the suspension after the impurities, if any, have been removed. See *Ceram. Abs.*, **2** [3], 51(1923); *ibid.*, **2** [6], 138; *ibid.*, **2** [8], 190.

IT is now time to begin thinking about the summer meeting on the Pacific Coast. This is going to be a wonderful opportunity to visit plants about which you have been hearing. Note the various items of equipment in these plants and see for yourself the relation between them and Journal advertisers.

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Columbus, Ohio

CERAMIC ABSTRACTS

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the Editor of *Chemical Abstracts* by cooperative agreement.

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Abrasives

Vitreous enameling in the electric furnace. J. L. MCK. YARDLEY. *Elec. World*, 82, 327; *Chem. Met. Eng.*, 29, 55-8(1923).—Recent furnace improvements include carborundum or carbofrax brick muffle, intermittent gas fire and elec. heat. Carborundum has $\frac{1}{8}$ the thermal resistance of fire clay. In the intermittent furnace, gas is burned directly in the chambers and heated above the required temp. Then the gas is turned off and the enamel is fused under falling temp. With 500 B.t.u. gas at 50 cents the fuel cost with intermittent gas furnace is 9 cents per 100 lbs. or 10 cents per 100 sq. ft. of surface. Cost in elec. furnace will be as low if power cost is 1 cent per kw.-hr. Furnaces for watch dials, bath tubs and sheet Fe are described and other cost data given.

R. J. M. (C. A.)

Report of Refractory Materials Committee. Jointing materials for silica refractories. D. JONES AND W. EMERY. *Gas J.*, 163, 157-9(1923); *Gas World*, 78, 646; cf. *Ceram. Abs.*, 2 [11], 255(1923).—The more nearly a jointing cement approaches in chem. compn. and phys. behavior that of the bricks with which it is used, the more satisfactory are the results obtained. Examn. was made of the effect of mixing in various proportions, fire clay, ganister and crushed silica brick, and, in some cases, of adding plaster, lime and Na_2SiO_3 . Mixts. of the 3 first materials, having either equal or greater proportions of ganister to crushed silica brick, give very good jointings. A high % of the latter renders the cement mechanically weak. For the bonding material, a small % of a highly plastic refractory clay is more satisfactory than a large proportion of fire clay of a less plastic nature. No advantage is obtained by the addn. of such materials as plaster, lime or Na_2SiO_3 to a cement which is to be used at high temps.

J. L. W. (C. A.)

Abrasive materials in 1922. L. M. BEACH AND A. T. COONS. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Pt. II, 221-5(preprint No. 25, publ. Dec. 3, 1923). See *Ceram. Abs.*, 3 [4], 109(1924).

E. J. C. (C. A.)

PATENTS

Process of treating the surfaces of crystalline mineral materials. MINER L. HARTMANN. U. S. 1,482,792, Feb. 5, 1924. The process of treating the surface of cryst. mineral material which consists in heating said material in contact with a halogen salt to a temperature sufficient to produce a surface reaction between said mat. and said salt but insufficient to produce glazing of the surface of said mat.

Process for treating surfaces of crystalline mineral material. MINER L. HARTMANN. U. S. 1,482,793, Feb. 5, 1924. The process of improving the bonding quality of crystalline mineral materials, which consists in moistening the material with a surface pitting acidic substance and heating to a temperature sufficient to produce a surface pitting reaction, but insufficient to produce glazing of the surface of the crystals, substantially as described.

Method of making abrasive wheels. PETER JOEL STYFFE. U. S. 1,485,132, Feb. 26, 1924. The method of making an abrasive wheel, comprising the steps of supporting the wheel consisting of granular abrasive and heat setting bonding material upon a substantial portion of its peripheral face by a refractory, retaining the wheel in such position and firing it while in this position to bond the abrasive grains.



Art

Forgeries of ancient stained glass. Methods of their production and detection.

J. A. KNOWLES. *J. Roy. Soc. Arts*, **72**, 38-56(1923); 7 figs. G. E. B. (C. A.)

PATENT

Beads. C. SEIDEL and N. BOTER. Brit. 204,627, Jan. 22, 1923. Beads, especially glass beads, are rendered iridescent by coating them with resin or a resinous substance, heating to fuse the resin, and exposing them to the fumes evolved by SnCl_4 , TiCl_4 , or other metallic compd. producing white vapors. (C. A.)

Cement, Lime and Plaster

The concrete masonry house today, the fireproof house tomorrow. ANON. *Concrete*, **24**, 41-3(1924).—The concrete masonry walled house which displaces other kinds of masonry, besides frame and veneer, is one kind of development; the other is the fireproof house with concrete floors and other unburnable features. Through its district representatives in all parts of the country, the Port. Cement Assn. compiled data which show that production of concrete block and structural tile of all styles and dimensions reduced to a volume term of 8 x 8 x 16 in. blocks amounted in 1920 to 50 million; in 1921 (a more complete survey), 175 million; in 1922, 297 million; and in 1923, 385 million. The production of concrete brick in 1923 is figured at 155 million. Reducing block to brick (1 block equaling about 13 brick) the 385 million block are the equivalent of a little more than 5 billion brick, and, adding the 155 million of concrete brick, concrete building units (not including dimension stone) total an equivalent of more than 5 billion, 185 million for 1923. Compare this with an estimated common clay brick production in 1923 of 6 billion. It is not to be assumed, however, that concrete units are displacing clay brick at any such rate. Concrete building units are swelling the total of masonry construction. It is getting business that clay units might have had if the clay industry had put a greater promotional effort behind its products and had no such formidable competition. F. T. H.

Rapid slaking of lime. J. E. DUCHEZ. *Rev. Mat. Constr. Trav. Pub.*, **164**, 80-2; 165, 104-7; 166, 127-30(1923).—In slaking burned lime contg. silica and alumina just sufficient water is added to slake the lime but not enough to hydrate any silicates or aluminates. The quantity of water to be used can be calcd. from the empirical formula, % water by wt. = $c - 1.7(a + b)/3$, in which the chem. compn. in wt. % is a SiO_2 , b Al_2O_3 and Fe_2O_3 , c CaO and MgO . The formula is derived from the following considerations: The compds. formed from SiO_2 , Al_2O_3 and CaO in making hydraulic cements are mainly $\text{SiO}_2 \cdot 2\text{CaO}$, $\text{SiO}_2 \cdot 3\text{CaO}$, $\text{Al}_2\text{O}_3 \cdot 3\text{CaO}$ and free CaO . In burning lime with mol. compn. x SiO_2 , y Al_2O_3 , n CaO , granting that the above compds. are formed the max. and minimum free lime left for hydration will be: (a) $x(\text{SiO}_2 \cdot 2\text{CaO}) + y(\text{Al}_2\text{O}_3 \cdot 3\text{CaO}) + [n - (2x + 3y)]\text{CaO}$; (b) $x(\text{SiO}_2 \cdot 3\text{CaO}) + y(\text{Al}_2\text{O}_3 \cdot 3\text{CaO}) + [n - 3(x + y)]\text{CaO}$. As the free lime only should be hydrated, the limits for the water content are: $[n - (2x + 3y)]\text{H}_2\text{O}$ and $[n - 3(x + y)]\text{H}_2\text{O}$. Converting the % chem. compn. of the lime into mol. ratios gives, $0.93a$ SiO_2 , $0.55b$ Al_2O_3 , $1c$ CaO . Substituting these values, the limits in wt. % are $\frac{1}{3}[c - (1.80a + 1.65b)]$ and $\frac{1}{3}c - [(2.80a + 1.65b)]$; the fraction $\frac{1}{3}$ being the ratio of water to lime used for slaking theoretically pure lime. Equalizing the factors in the max. limit gives the empirical formula. The calcd. values agree with the quantities used in practice:

| Lime from: wt. % compn. | Tarn. | Aude. | Cantal. | Basses-Alpe |
|---|-------|-------|---------|-------------|
| SiO_2 | 4.5 | 0.75 | 16.32 | 25.21 |
| Al_2O_3 and Fe_2O_3 | 3.1 | 0.32 | 4.00 | 1.32 |
| CaO and MgO | 91.94 | 97.70 | 77.58 | 72.00 |

Water of hydration: wt. %

| | | | | |
|---------------------|-------|-------|-------|------|
| Calcd. from formula | 26.04 | 31.29 | 14.34 | 8.96 |
| Used in practice | 25 | 32 | 15 | 10 |

Lime crushers, hydration systems and storage bins are described with special reference to installations made by the author. L. N.

Heat balance of a rotary cement kiln. CH. BERTIN. *Rev. Mat. Constr. Trav. Pub.*, **164**, 97-100; **165**, 121-3(1923).—Calcs. are given to show that in firing a rotary cement kiln with coal the usual distribution of heat is as follows: (1) for evapn. of water 30%, (2) losses of heat through stack 14%, (3) losses by radiation from metal covering 6%, (4) losses due to cooling of the hot clinker 12%, (5) leaving 38% of the heat used for the actual decompn. of the carbonates and for starting the chem. reactions. It is recommended that where possible less water be used for mixing, that provisions be made for draining off excess water, that the stack heat be utilized in heating up the water used in mixing the raw materials, and that the air for combustion be preheated by the heat generated by the cooling clinker mass. L. N.

Manufacture of cement tile. P. LOZACH. *Rev. Mat. Constr. Trav. Pub.*, **167**, 187-9(1923).—A general description of the process of making cement tile. L. N.

Note on the use of liquid fuel in the ceramic industry. ALIX CORNILLE. *Rev. Mat. Constr. Trav. Pub.*, **167**, 142-3B(1923). L. N.

Recommended specifications for quicklime and hydrated lime for use in the manufacture of sand-lime brick. ANON. Bur. of Stand., *Circ.* **150**.—This is the 6th of a series of specs. for the lime used in various chem. industries. To assist in the development of these specs., the bureau has called together an Interdepartmental Conference on Chem. Lime, composed of representatives of the Geological Survey and Bureau of Mines, of the Interior Department; the Bureau of Soils, Bureau of Chemistry, Forest Service, and Fixed Nitrogen Research Lab. of the Department of Agriculture; and the Chem. Warfare Service of the War Department. The present specs., based on a draft originally prepared by W. E. Emley, of the lime section, Bureau of Stand., has been unanimously approved by the above conference and by the Nat. Lime Assn. Either quicklime or hydrated lime may be purchased for making sand-lime brick, but the former must be completely hydrated before it can be used. Mat. of about 85% purity and reasonably low in magnesia is required. The lime must also be reasonably fresh, as indicated by a low content of carbon dioxide. Methods of anal. are given in detail. H. F. S.

Wall plaster: Its ingredients, preparation and properties. ANON. Bur. Stand., *Circ.* **151**.—The art of plastering is intimately connected with the comfort and safety of the occupancy of buildings, yet few outside the trade understand the nature of the mat. and the details of the work required to produce the desired results. The recently aroused interest in building has carried with it interest in plastering. Much information about the factors which enter into successful plastering was found available in the trade. This paper represents an attempt to collect and correlate this information for the public benefit. To assist in the work, a committee known as the Bureau of Standards Plastering Conference was organized of men most familiar with the different phases of the subject. From the information thus furnished, and from lab. research work, we have been able in many cases to explain not only how an operation is conducted but also why this is the best way of doing it. It is recommended that furring be used when plastering exterior masonry walls, to prevent damage due to condensed moisture. When masonry walls are to be plastered without furring, the surface of the masonry should be true and clean and of proper degree of wetness. Specifications and directions for erecting are given for wood, wire and metal lath, and gypsum plaster board. Descriptions and specs. are given for the ingredients of plaster—lime, gypsum, cement, sand, hair,

water, etc. The chief properties of the wet mix. are discussed, as they affect the quality of the finished plaster. Complete directions are given for the mixing of the ingredients and the application of the wet mix. to the wall. The chief properties of the hardened plaster are discussed as they affect the comforts and safety of the occupant. Different kinds of decorative features are described. Some of the common defects are described, and their causes and remedies suggested. Attention is called to the factors to be considered when selecting materials for plastering in order that they may be best adapted to the particular case.

H. F. S.

Recommended specifications for quicklime and hydrated lime for the manufacture of silica brick. ANON. Bur. Stand., *Circ.* 153.—A brief description of the way in which lime is used in the manuf. of silica brick is followed by a gen. statement as to the quality of lime required. The stand. of quality is set at 92% based on the nonvolatile matter, with max. limits of 5 and 10% carbon dioxide, depending upon whether the sample is taken at point of shipment or of destination. Complete directions for sampling and testing are included.

H. F. S.

The chemico-technical and mechanical properties of caustic magnesite. ANON. *Baumaterialien-Markt, Leipzig*, 36 and 38(1921).—This publication consists of two lectures delivered before the general meeting of the Verband Deutscher Steinholfabrikanten in Nurnberg dealing with the tests of caustic magnesite as a building material. The researches were carried out by L. Jesser in collaboration with chemists of the laboratory of the Austro-American Magnesite Company. In determining the value of caustic magnesite for use as a building material chemical tests are not adequate. The important tests are for fineness of grind, hardening characteristics, volume stability and tensile strength. The fineness test is made by screening through two sieves of widely different sizes of mesh opening. The test for set or hardening is a "pat" test carried out as follows: 100 grams of the magnesite is kneaded with about 40 to 50 cc. of a 20° Bé magnesium chloride solution to a standard consistency. The mass is formed into tapering pats on a glass plate. The resulting hardness is then determined with the Vicat needle. The material should have a setting time of between 2 and 5 hours. In making this test the pat should be covered to prevent rapid drying. The test for volume stability is made by mixing the magnesite with pine sawdust in the ratio of 1 to 2 by volume (3 to 1 by weight) moistening with 20° Bé magnesium chloride solution and making into forms by gentle pressing. After 24 hours the samples are removed and measured. It is assumed that the formation of the Sorel Cement is complete in this time. The measurements are kept up every day for 1 month. The most significant results are obtained, however, during the first 10 or 14 days. The volume change should not amount to an expansion of more than .15% of the length nor to a contraction of more than .25% of the length. The air to which the specimens are exposed should not vary more than 6% from a relative humidity of 60%. The sawdust should consist of 50% 0-.1 min., 10% 1 to -1.5 min., 40% 1.5-2 min. The test for tensile strength is to be made on the same material as was used in the preceding test. Tests should be made after 3, 7 and 56 days. After 3 days the tensile strength should be more than 8 and less than 25 kg. per sq. cm.; after seven days not less than 20 kg. per sq. cm. and after 56 days not less than 40 kg. per sq. cm.

M. E. HOLMES

The action of sugar on cement mortars. CONSTANTIN TSOUNTAS. *Bull. inst. Egypte*, 5, 157-62(1923).—Expts. confirmed previous statements as to the deteriorating effect of the presence of sugar in the water used for making cement mortars. The time required for setting was considerably shortened. The resistance, in the hot water test of Le Chatelier, was destroyed. The resistance was lowered as the sugar content increased to the point where, with high concs., the mortars completely disintegrated. This effect of sugar is a serious factor only in the neighborhood of sugar mills.

P. R. D. (C. A.)

Fused cement or "Alcement." RUD. CHRISTIANI. *Teknisk Ukeblad*, **41**, 143-66 (1923).—The author gives the procedure for manuf. fused cement. The fusion is carried out in elec. furnaces or in water-jacketed furnaces. The raw materials are bauxite and lime. The av. compn. of alcement is approx. 40 CaO, 10 SiO₂, 40 Al₂O₃, and 10% Fe₂O₃. The main chem. constituents are Ca aluminates. The compn. of the raw mixt. can be varied within very wide limits and still good cements be obtained. The rate of cooling has a great influence upon the qualities of the fused cement. Per ton of alcement 2000 kw. hr. + 100 kg. electrodes is required for elec. fusion and 750 kg. coke for fusing in water-jacketed furnaces. A report is given of a series of assays made to compare the alcement with com. Port. cements. Alcement hardens much more quickly than do the com. cements. By tests with neat cement as well as with usual mortar mixts. the alcement showed greater tensile and crushing strengths than com. cements, in most cases even when aged for more years. The results are given in several tables. Only small differences are found between the strengths obtained by water-hardening and those obtained by air- or combined hardening. Driving tests to compare the resistance of poles molded from ordinary concrete and from alcement concrete and aged for different periods showed a considerable difference in favor of the latter. This is also said to be completely sound in all cases. It is more acid-proof than Portland cement. Neat alcement evolves a considerable amt. of heat during the binding, but in concrete mixts. this effect is of no importance. The Dan. State Lab. for Testing Materials found the following compn. of a sample of alcement: SiO₂ 10.0, Al₂O₃ 37.8, Fe₂O₃ 0.2, FeO 5.5, FeS 0.6, TiO₂ 1.7, CaO 42.4, MgO 0.3, SO₃ 0.7, and moisture 0.3%.
C. H. A. S. (C. A.)

Enamel

Wet-process enamels for cast iron. R. R. DANIELSON AND H. P. REINECKER. *Bur. Stand., Tech. Paper 246*.—Part of the results given in this paper are reported in *Jour. Amer. Ceram. Soc.*, **5**, 647-69(1923). Wet-process enameling of cast iron is becoming of importance because of its application to the enameling of stove parts, sanitary fittings, and hardware. This paper is a report of an extended investg. of wet-process enamels for cast iron, both with and without the use of ground coat. Compns. used in dry-process enameling have served as a basis for the work. The effect of varying methods for prepn. of the frits, mill additions, and relation of compn. of the enamel to such properties as adherence, texture, and opacity have been carefully studied. *Ground coats*.—Sintering of most ground-coat frits has been found desirable in order to develop best adherence of the enamels to the casting. Clay gave best results as a mill addition

GROUND COATS

Batch Compns. of Frits

| Enamel | Flint | Borax | Sodium nitrate | Soda ash | Red lead | Boric acid |
|--------|-------|-------|----------------|----------|----------|------------|
| Rg-1 | 69.90 | 36.96 | 6.95 | .. | 8.17 | .. |
| Rg-17 | 69.90 | 36.96 | 6.95 | .. | 4.08 | 7.08 |
| Rg-18 | 69.90 | 26.07 | 6.95 | 3.04 | 12.24 | .. |
| Rg-25 | 69.90 | 26.07 | 6.95 | 9.88 | 8.17 | .. |
| Rg-26 | 66.30 | 36.96 | 6.95 | .. | 8.17 | 6.37 |

for the ground coats and flint and feldspar were found to be less satisfactory. Excessive additions of clay or flint produced flaking of the ground coat, while feldspar tended to develop blistering. About 15% of clay or 10% each of clay and flint are recommended as mill addition for the ground coat. Excessive additions of any one flux were not desirable and best results were obtained in more or less definite proportions. Sodium

oxide in excess of about 10% gave rise to blistering. Boric oxide increased the firing range of the ground coat and was preferable to lead oxide on this account, although it tended to promote crawling of ground coats high in boric oxide if they were applied somewhat heavily. The best ground coats developed are given in the accompanying typical batch compns.

Mill additions.—15% of clay or 10% each of clay and flint based on the wt. of the frit, with such additions of water as may be necessary. *Cover enamels.*—These were smelted by the usual method for enamels. The mill additions consisted of 5% of clay, 8% of tin oxide, and 45% of water, all based on the wt. of the dry frit. For best results the cover enamel must be adapted to the ground coat in refractoriness. Boric oxide increased the firing range of the enamel, but tended to promote crawling, although this was less pronounced in the case of the more fusible compn. Boric oxide improved the capacity when substituted for such fluxes as sodium and lead oxide. Cryolite increased capacity, but additions above 10% tended to promote crawling. The following compns. are typical of those which gave satisfactory results:

WHITE COVER ENAMELS

Batch Composition of Frits

| Enamel | Feldspar | Flint | Borax | Sodium nitrate | Red lead | Zinc oxide | Fluor-spar | Cryolite | Boric acid |
|--------|----------|-------|-------|----------------|----------|------------|------------|----------|------------|
| R-1 | 38.0 | 12.0 | 24.52 | 6.20 | 3.86 | 16.42 | 6.0 | 5.5 | .. |
| R-11 | 33.0 | 12.0 | 24.52 | 6.20 | 3.86 | 21.60 | 6.0 | 5.5 | .. |

WHITE COVER ENAMELS

Batch Composition of Frits

| Enamel | Feldspar | Flint | Borax | Sodium nitrate | Soda ash | Red lead | Zinc oxide | Fluor-spar | Cryolite | Boric acid | Barium carbonate |
|--------|----------|-------|-------|----------------|----------|----------|------------|------------|----------|------------|------------------|
| R-1 | 38.0 | 12.0 | 24.52 | 6.20 | 3.86 | 16.42 | 6.0 | 5.5 | 5.0 | .. | .. |
| R-11 | 33.0 | 12.0 | 24.52 | 6.20 | 3.86 | 21.60 | 6.0 | 5.5 | 5.0 | .. | .. |
| R-14 | 38.0 | 12.0 | 10.90 | 6.20 | 7.70 | 21.60 | 6.0 | 5.5 | 5.0 | .. | .. |
| R-18 | 33.0 | 12.0 | 24.52 | 6.20 | 3.86 | 16.42 | 6.0 | 5.5 | 10.0 | .. | .. |
| R-28 | 40.0 | .. | 54.5 | 5.95 | .. | 10.3 | 5.0 | 5.5 | .. | 8.85 | 4.5 |

Single-coat colored enamels.—These enamels are smelted in the same manner as used in the prepn. of the white cover enamels. The effects of the various ingredients are very similar to those noted in the case of white cover enamels. Suitable mill additions consist of 4% of clay, 50% of water, and the necessary amts. of color oxide to give the colors desired. The feldspar type of enamels are apparently more satisfactory than those containing flint as the sole refrac. The following compns. are typical of those which have given very satisfactory results:

SINGLE-COAT COLORED ENAMELS

Batch Compn. of Frits

| Enamel | Feldspar | Borax | Sodium nitrate | Red lead | Soda ash |
|--------|----------|-------|----------------|----------|----------|
| Ro-6 | 47.05 | 36.94 | 4.63 | 27.81 | 7.64 |
| Ro-5 | 47.05 | 50.57 | 4.63 | 22.71 | 3.90 |

Single-coat white enamels.—In the production of white single-coat enamels it is necessary to develop max. opacity in the frit, since the addition of more than 3 or 4% of tin oxide in the mill batch caused blistering of the enamel when applied to the iron. Suitable mill additions for enamels of this type are as follows: Clay, 4%; tin oxide, 4%; and water, 45%. In no case were the results with the single-coat white enamels as satisfactory as

those obtained with a white enamel applied over a ground coat, particularly in regard to the opacity. The following enamels are typical of those which gave the most satisfactory results:

SINGLE-COAT WHITE ENAMELS

| Material | Batch Compn. of Frits | |
|----------------|-----------------------|-------|
| | Ro-16 | Ro-38 |
| Feldspar | 45.05 | 45.05 |
| Borax | 50.57 | 39.67 |
| Sodium nitrate | 4.63 | 4.63 |
| Red lead | 22.71 | 22.71 |
| Soda ash | 3.85 | 6.87 |
| Antimony oxide | 2.00 | 2.00 |
| Cryolite | 0.00 | 4.00 |

Mill Batch

| | |
|-----------|-------|
| Frit | 100.0 |
| Clay | 4.0 |
| Tin oxide | 4.0 |
| Water | 45.0 |

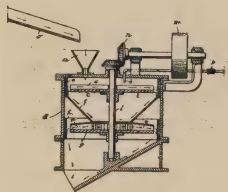
H. F. S.

Recommended specifications for ceramic whitening. ANON. Bur. Stand., *Circ.* 152. —This is the 5th of a series of specs. for the kinds of lime required by different chem. industries. The preceding 4 dealt, respectively, with lime used in cooking rags, in causticizing and in the manuf. of sulphite pulp and glass. This deals with lime used in making glazes, enamels, and similar ceramic products. Ceramic whitening is really calcium carbonate, with or without a small amount of magnesium carbonate, but it performs the function of lime. It should contain not less than 97% of carbonates, and should be very fine, so that 98% of it will pass a No. 200 screen.

H. F. S.

PATENT

Method and apparatus for granulating liquid slag. EMIL OPDERBECK. U. S. 1,483,241, Feb. 12, 1924. Method for granulating liquid slag, consisting in feeding the



liquid slag onto a centrifugally operating expelling element, capable of impelling the slag against an abutment, and in supplying water onto said element in quantities limited by the amount which the heat supplied by the slag is capable of converting into steam, to cause the granulation of the slag into dry slag sand.

Glass

The production of colorless glass in tank furnaces.

A. COUSEN AND W. E. S. TURNER. *Glass Worker*, 43 [19], 15(1924).—Meeting of the Soc. of Glass Tech., Jan. 16, 1924. Glasses containing arsenic and decolorized with selenium turn yellow when exposed to sunlight while glasses originally yellow, due to selenium without arsenic, become bleached by sunlight. Yellow selenium glasses reheated to 500° to 600°C become deeper in color. When pink selenium glasses containing arsenious oxide or sodium nitrate are reheated to 500° to 600°C a loss of color occurs.

R. J. M.

The new Edward Ford plate glass plant. HENRY W. HESS. *Glass Worker*, 43 [23], 11 (1924).—The plant has 16 furnaces of 20 pots each. Grinding machines by Hooven, Owens, Rentschler Co., casting tables by Rosedale Foundry & Mach. Co., lehr by J. W. Cruikshank Eng. Co., Morgan gas producers, coal handling equipment by

R. H. Beaumont Co., a Proctor and Schwartz drier for pots and Babcock & Wilcox Co. boilers.

R. J. M.

The use of selenium as a decolorizer. R. R. SHIVELY. *Glass Indus.*, 5, 26-7 (1924).—As a decolorizer $\frac{1}{8}$ to 1 oz. Se per 1000 lbs. sand is required. A neutral fire should be maintained in tanks when Se is used. The hotter the tank the less Se is required. Not more than 42 lbs. soda ash per 100 sand should be used in the batch or a dark coloration occurs with Se.

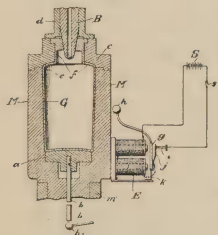
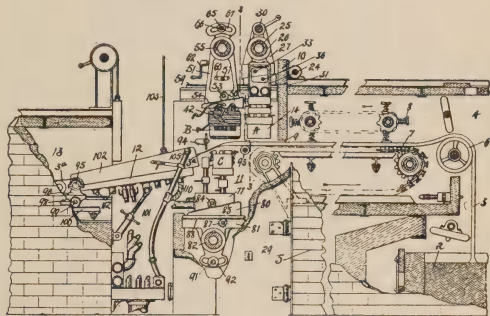
D. E. S.

The Department of Glass Technology, Sheffield, England. W. E. S. TURNER. *Glass Indus.*, 5, 39-40 (1924).

D. E. S.

PATENTS

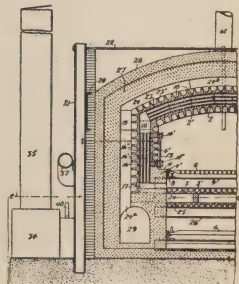
Method and apparatus for forming glass. ROBERT M. CORL. U. S. 1,483,336, Feb. 12, 1924. The method of forming sheet glass, which consists of continuously drawing a thick mass of glass in sheet form from a molten source of supply, the sheet mass being drawn in a plane at an upward angle to the surface of the molten mass, and, while conveying the sheet mass away from the drawing source and maintaining heat therein, applying a converting heat to the sheet mass to continuously flow a sheet of predetermined thickness therefrom and then conveying the thinned sheet through a gradually reducing temperature. The combination with a furnace of the class described from which a column of metal feeds, of a shaft extending transversely of the column and to one side thereof, and a heater carried by said shaft for adjustment lengthwise thereof to place it in operative or inoperative relation to said column. The combination with a furnace from which a sheet of glass continuously passes, of a substantially horizontal table for supporting said sheet at a predetermined distance from the furnace as it passes therefrom, the delivery end of said table being pivoted and the receiving end thereof being mounted for vertical swinging adjustment to vary the point of contact of the sheet therewith, the table having its sheet contacting surface corrugated, and means for tiltingly adjusting the table. (Cf. *Ceram. Abs.*, 3 [2], 40 (1924).)



a succession of blows. The method of producing a smooth finish on glassware, which comprises introducing molten glass into a mold, and vibrating the mold while the glass is in a plastic condition.

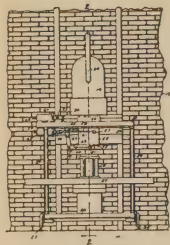
Annealing leir or furnace. ROBERT D. PIKE. U. S. 1,486,265, Mar. 11, 1924. A glass annealing leir comprising a muffle, enclosed passageways formed in the walls of the muffle and communicating with the interior thereof,

Method of molding glassware. JOHN A. MILLIKEN. U. S. 1,482,760, Feb. 5, 1924. The method of molding glassware, which comprises introducing molten glass into a mold and causing it to take the form of the mold, and simultaneously applying to the mold



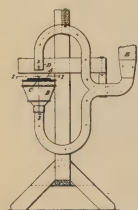
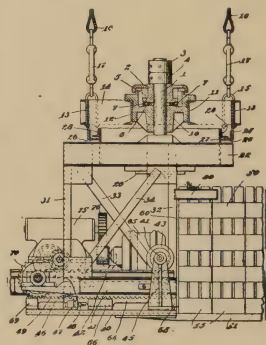
said passageways being so arranged as to receive heat transmitted from the walls of the muffle so as to cause convection currents to be circulated over the articles within the muffle.

Method of and apparatus for feeding molten glass into molds. ALEXANDER L. SCHRAM. U. S. 1,484,907, Feb. 26, 1924. The method of gathering glass from a flowing stream, which consists in establishing a regulated flowing stream of glass, simultaneously severing and enlarging the stream below the outlet at intervals, utilizing the enlarged severed end of the stream as a moving plastic support for the on-coming stream of glass and a portion of the gathered mass, bodily arresting the downward movement of the accumulated mass until a sufficient quantity to make the desired article has been accumulated, simultaneously releasing the accumulated mass on its bottom and shearing the stream above the accumulated mass, and lastly releasing the accumulated mass on its sides.



Bricksetting machine. GRAFTON E. LUCE. U. S. 1,487,688, Mar. 18, 1924. Brick handling app. of the kind described, consisting in means to engage and lift a stack of brick, including means to contact with substantially the central portion of the foundation rows of brick in the stack, said brick engaging means having mechanism adapted to move the same under the brick while the carrier is stationary for loading the brick stack onto the carrier, said brick engaging means being movable rearwardly to release the brick stack for unloading.

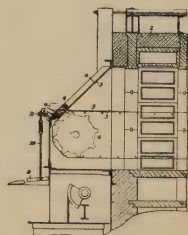
Sealing metal to glass. NAAMLLOOZE VENOOTSCAP PHILLIPS GLOEILAMPENFABRIEKEN (Eindhoven, Holland). Brit. 202,941, Oct. 25, 1922. For sealing lead-in wires, etc., a ring or cap of chromium iron alloy is used, having an expansion coeff. approx. that of glass. Various uses are indicated. Lead-in wires may be welded to the metal, which seals easily to glass.



Heat treatment of glass articles. JESSE T. LITTLETON, JR. U. S. 1,483,461, Feb. 12, 1924. The hereinbefore described method of heat treatment of pressed glass articles to increase their thermal and mechanical endurance which consists in heating the article after pressing to equalize the temperature of different parts thereof, and in then rapidly uniformly cooling the article from a substantially uniform temperature above the annealing temperature of the glass of which it is composed by high velocity air jets directed on substantially the entire surface of the article.

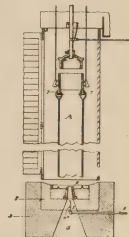
Process of and mixture for making glass. ALEXANDER L. DUVAL, D'ADRIAN. U. S. 1,482,389, Feb. 19, 1924. A glass-forming mixture containing iron and a chlorine compound adapted to act as an oxidizing agent.

Charging doors for leers. EDWIN E. MILNER. U. S. 1,484,521, Feb. 19, 1914. An annealing leer having a charging opening, inclined frame members arranged across such opening and spaced transversely from each other, a charging door pivotally mounted between each pair of said frame members and arranged to close upwardly and outwardly against said members, each of said doors having a counterweight substantially balancing the door but arranged to normally hold it in closed position, together with separate actuating means for opening each of doors, substantially as described.



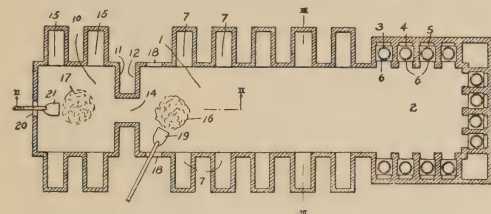
Manufacture of glass cylinders. CLYDE S. ROBB. U. S. 1,484,339, Feb. 19, 1924. In apparatus for drawing glass cylinders, a batch containing vessel, a conduit extending upwardly therethrough opening directly within the formative zone of the article being drawn and in open communication with the atmosphere below, and an air supply pipe leading to but spaced away from said conduit to supply air upwardly through the conduit while allowing for return flow of excess air backwardly through said conduit and around said pipe.

Borosilic acid glass. KITSUZO-FUWA AND TOKYO DENKI KABUSHIKI KAISHA. Japn. 42,161, Mar. 31, 1922. The glass contains SiO_2 66.0–67.5, Al_2O_3 1.0–1.75, Na_2O 7.0–8.0, and B_2O_3 22.0–24.0%. It resists sudden change of temp., *e. g.*, it can be heated to 290° and dipped into H_2O at 23° without cracking. It adheres to W-wire and is resistant to efflorescence. It is easily worked with an ordinary coal-gas burner.



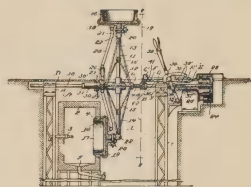
(C. A.)

Glass-melting tank. HARRY G. SLINGLUFF. U. S. 1,486,992, Mar. 18, 1924. The combination with a regenerative glass melting tank having a melting end and a discharge end of means for supplying

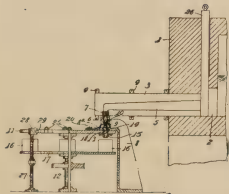


molten glass to said melting end of the tank. The process of operating a regenerative glass melting furnace which consists in supplying batch to the melting end of such furnace and also feeding molten glass into such melting end to the rear of said batch.

Glass-drawing device. WILLIAM WESTBURY. U. S. 1,484,101, Feb. 19, 1924. The combination of a heating kiln having an opening in a vertical wall thereof, a carrier rotatable on a horizontal axis, means for rotating said carrier, pots tiltably mounted on the carrier, eccentric mechanism operative on the rotation of the carrier for reversely tilting the pots between vertical and horizontal positions, and means for sliding the carrier back and forth to move a vertically disposed pot into and out of the kiln opening.



Automatic flow for glass tanks. WILLIAM H. McSWAIN and HARRY W. McSWAIN. U. S. 1,484,952, Feb. 26, 1924. An automatic flow for glass, comprising, in combination with a glass tank, a spout leading from the tank, a horizontal stand located beneath said spout and having a vertical passage therethrough, means for conducting glass from said spout to said passage, a rotating table having the edge portion thereof in closely underlying relation to said stand and having oblong openings in said edge portion, said openings being located to be successively carried by rotation of the table into register with said passage for receiving glass from the latter, a shear, means for actuating said shear across the lower end of said passage at a definite point in the registration of each table-opening with said passage, a second table located beneath the first table and molds carried by the second table in position to receive charges of glass detached by said shear.



Glass furnace. SADAJIRŌ KŌNO. Japn. 41,629, Jan. 31, 1922. Addn. to 35,150. A small furnace fixed to the main one for holding clear melted glass has a delivery orifice in the bottom, in which a rod rests. By the piston-like motion of the rod, a definite

quantity of melted glass is pushed away from the orifice, and is received in a mold of a suitable form.

Glass. TOSAKU YOSHIOKA. Japn. 41,227, Dec. 22, 1921. Addn. to 40,242 (*Ceram. Abs.*, 2 [7], 155 (1922)). Superheated steam is passed into a mixt. of 100 parts of SiO_2 , 22 parts of limestone, and 33 parts of NaCl, heated in a revolving furnace at about 700° . The NaCl is decompd., producing HCl gas, and the SiO_2 is changed into Na salt. Then the mixt. is heated more highly and melted to glass. The mixt. is liable to become powdery and prevents the passing of steam; this difficulty is removed by mixing 2-3% CaO paste with the original mixt.

Etching glass. NAAMLOOZE VENOOTSCHAP PHILLIPS GLOEILAMPENFABRIEKEN. Brit. 189,763, Nov. 8, 1922. A process for producing transparent markings on frosted glass, such as trade marks on lamp bulbs, consists in printing or stamping the required design on the glass in an acid-resist and then etching the glass. The resist may be composed of "Lanoline," beeswax and resin with or without resin-oil and horse-fat, and is preferably applied to the glass in a fused state.

Heavy Clay Products

Construction features of importance to clay plants. T. W. GARVE. *The Clayworker*, 80, 442-5(1923).—See *Jour. Amer. Ceram. Soc.*, 6, 961-71(1923). J. W. H.

A new French system of brick manufacture. ANON. *Brit. Clayworker*, 32, 256-60(1923).—Dry press brick plants at Charleroi, Belgium and Lens, France, using a patented "humidicator" are described. The apparatus is designed for adding a small measured percentage of water to clay which has been previously dried and ground to a fine powder. It comprises three shallow pans, one above the other, fixed to the frame of the machine. Each pan is provided with a number of steel blades fixed to arms keyed on a central vertical rotating spindle, and so disposed as to thoroughly churn the powdered clay in order to expose every part of it to the finely atomized water blown downward upon it from a number of fine jets. The water passing by gravity from a graduated tank or container, meets at the jets with a blast of air under pressure and is blown as an invisible spray on the ground clay in the top pan. A stream of the clay is delivered, at a measured rate, into the top pan near its center. The revolving blades gradually pass the clay from the center to the periphery where openings are provided to allow it to fall into a second pan. A similar set of blades, revolving on the same vertical spindle, churn the clay in the second pan and at the same time pass it to the center. It then falls through openings in the third pan, which is provided with a third set of blades. These repeated churnings effect a uniform mixture of the moisture with the clay. The methods of mining, grinding and screening at Lens are of interest. The clay used at this plant is a sandy loam only 4' in thickness. It is excavated with a Bondy surface excavator by means of which the clay is delivered from the clay bank by an arm fitted with a conveyor into wagons running on rails. After passing through rolls the clay is run through a drying tube. This machine is 49' long and 5' 9" diam. and is encased in brickwork except where the two carrying rings and the driving gear ring occurs. The carrying rings or trunions allow a smooth turning movement. A furnace built at the end where the clay enters provides the heat for drying. The hot gases go with the clay from the hot end to the dry end and are exhausted into a chimney by an induced draft fan. At the dry end the clay, still warm, passes directly into a large ball mill and is ground to a size of about 30 mesh. The ball mill screens the clay to the required fineness and it is conveyed by belt conveyors to two humidicators, each of which serves three presses. The hydraulic presses have gages attached to them which show a pressure of 110 tons for two bricks.

H. G. S.

Proposed specifications for roofing tile. ANON. *Tonind. Ztg.*, **48**, 101-2(1924).—Roofing tile should be true in shape, having a good ring and a pure color. They should show no efflorescence or flashing. *Body*.—The body should show a uniform fracture without laminations. It should be free from lime and pyrite nodules. *Shape*.—The principle shapes are flat tile, grooved tile and plate tile besides the ridge tile. The standard dimensions for flat, plate and ridge tile are given in specifications in *Tonind. Ztg.*, **40** (1920). The sizes for grooved tile have not yet been specified. *Weight*.—The weight of normal flat tile should not be over $1\frac{1}{4}$ kgs.; that for plate tile not over 2 kgs.; and that of grooved tile not over 2.9 kgs. *Absorption*.—The average absorption of 10 tile is detd. These are thoroughly dried and then boiled in water to constant wt. The increase in weight for vitrified tile should not be over 6% and that for porous tile not over 17%. These should be designated as clay and loam tile, respectively. *Permeability*.—The permeability of tile to water is detd. in the following manner: A round piece is broken from the tile having a diam. of approx. 2 cms. larger than that of the glass cylinder which is 3.5 cms. In diam. (= 9.7 sq. cms.). The tile is trimmed with pinchers down to nearly the proper size and then is ground in a conical shape on the grind stone. The diam. of the lower portion of the test piece should be equal to that of the glass cylinder while the diam. of the upper portion should be larger than that of the glass cylinder. The glass cylinder is then cemented to the upper portion of the tile with a cement. The cement and conical sides of the tile are painted with a lacquer making them impervious to water. The glass cylinder is filled to a height of 15 cms. It is allowed to stand one hr. If drops penetrate through the tile it is considered pervious to water. *Cross breaking strength*.—The tile are placed on supports 30 cms. apart and a load is applied in the center. Standard tile must have a strength of not less than 100 kgs./cm.² when dry, not less than 90 kgs./cm.² when wet and not less than 80 kgs./cm.² when subjected to 10 freezing treatments. The formula $3Pl/2bh^2$ is used in calculating the cross-breaking strength. *Resistance to frost*.—Roofing tile of all kinds must be resistant to frost. The tile to be tested are placed in water and frozen to -15°C for 14 hrs. and are thawed out at 20°C . This is done 25 times. The tile show no signs of disintegration. The same test is used for colored, glazed and engobe tile. *Glaze*.—The glaze should be well united with the body. Craze cracks on the glaze are permissible. The glaze should not peel from the body after long periods of time. The same specs. apply to engobed tile. *Hardness*.—The body should have a hardness of 5 and the glazes of 7.

H. G. S.

Firing with producer gas. C. F. SMITH. *Brick & Clay Record*, **63**, 770-1(1923).—Author gives excellent hints on opern. of a gas producer fired continuous chamber kiln for burning brick. Chambers are 49 ft. long, 14 ft. wide and 9 ft. high. Chambers are burned off at the rate of one every 24 hrs. For best practice the kiln should have at least 13 chambers. Coal consumption is 800 lb. per thousand g. in brick. Slack coal is the cheapest fuel but unless the producers are especially designed for its use, it cannot be used. Nut, run of mine and lump coal are satisfactory. The nut gives best results but on the other hand is hard to get. When run of mine or lump is used, the large lumps should be broken, while run of mine containing much slack should be avoided. The principal requirement of a coal for producer's work is that it be high in volatile matter. The ideal coal is one that gives off its volatile matter slowly, keeping up a steady supply from this source while the CO is coming from the fixed carbon. The surface of the fuel bed must be watched for holes or bright spots which show that the air is channeling. Producer gas made in the type of producer generally used will deposit tar at temp. below 800°F . These temp. refer to gas as it leaves the producer. The neutral zone is between 800° and 900°F .

J. W. H.

Oil firing clay products. (III-IV.) W. D. RICHARDSON. *The Clayworker*, **80**,

458-59; 552-53 (1923).—A moderate sized plant should have storage capacity for 50,000 gal. of oil, while a large plant for 100,000 gal. or more. Strainers for removal of foreign matter held in suspension should be placed (1) before entering storage tank, (2) on suction line between storage tank and pump, (3) between pump and heater, (4) finest strainer between heater and burners. Moreover the strainers should be in duplicate and in parallel, so that one may always be clean. Oil is usually heated by steam to permit of flowing. Very little steam is required as sp. ht. of fuel oil is but one-half of that of water. Oil is generally heated between 150° and 180°F. Unless oil is heated to a temp. approaching its flash point before admission to burners, the atomization is apt to be incomplete. Fluctuating oil temp. will cause flame to be unsteady. Long

oil lines from storage tanks are kept warm by running the steam lines parallel in same trench or conduit. Oil pumps are of low or high pressure, electric or steam driven, of the piston or centrifugal type. Use of air (for atomization) above 5 lb. involves use of piston driven compressors, which are objectionable on account of high cost of installation and opern. Hence tendency is to use low pressures. Cuts of various pumps, strainers and blowers accompany the articles.

J. W. H.

PATENTS

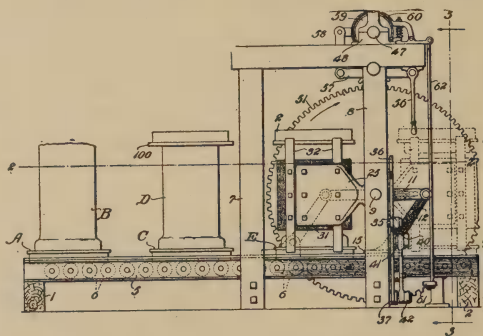
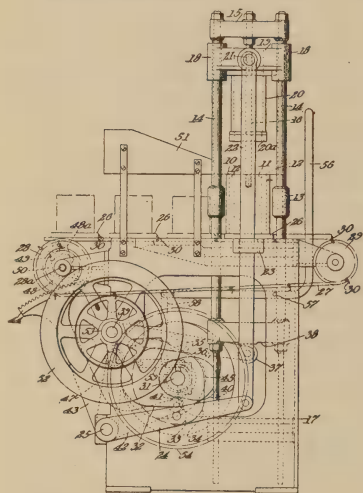
Tile-making machine. MORRIS KATCHER and ROWLAND McWILLIAMS. U. S. 1,483,513, Feb. 12, 1924. In a machine for making hollow tile, the combination of two mold elements de-

fining a vertical interspace for receiving the material to be molded, a ram having a cross-sectional configuration corresponding to the interspace, a support below the mold elements, mechanism for cyclically moving the mold elements, the ram and the support relatively to each other to compress material in the molded block upon the support, manually operable control means for setting the mechanism into motion and means for automatically stopping the mechanism at the end of a cycle of operation.

Clay-pipe-handling device. GEORGE W. GANG. U. S. 1,486,877, Mar. 18, 1924. In a machine for turning pipe sections, a rotatable shaft, a pair of cradle members

keyed to said shaft and slidable thereon and means for rotating said shaft.

Method of and apparatus for flashing brick. CONRAD DRESSLER. U. S. 1,486,129, Mar. 11, 1924. The method of flashing brick in a



continuous muffle heated kiln which consists in passing fuel and air for its partial combustion into a high temperature portion of the kiln chamber to thereby maintain a reducing gas atmosphere in said kiln chamber portion and in the portion of the cooling zone of the kiln in which the brick are at a temperature high enough to result in surface oxidation if exposed to an oxidizing atmosphere.

Refractories

Research on refractories in France. V. BODIN. *Ceramique*, 26, 200-6(1923).—

The following investigation was conducted in the laboratory of the Refractories Association of France. 12 silica, 7 quartzite, 5 fire clay, 10 highly aluminous, and 4 bauxite brick were tested. The chem. analyses, the permanent expans. and contraction, the reversible expans. and contraction and the softening points were determined. According to B. a good fire-clay brick with 30% Al_2O_3 withstands 1600°C for 2 hrs. without deformation; good silica and highly aluminous brick withstand a similar test at 1700°C; the linear change of a good quartzite brick should be less than $1-1\frac{1}{2}\%$, after heating to 1500°C for 3 hrs.; the shrinkage of a good fire-clay brick should not be over 1.5% after heating to 1600°C for 2 hrs.; highly aluminous brick should show a linear change of less than 1% when heated to 1600°C and less than 2% when fired to 1700°C. The reversible expansion tests showed only small differences in the brick and seemed to be dependent chiefly upon the chem. compns. It is largest with silica brick. Strength tests conducted on 2 cm. cubes showed maximum and minimum points when tested between 700° and 1500°C in each case with the exception of magnesite and chrome brick. The resistance of refractories to load was conducted on 2-cm. cylinders 5 to 6 cms. high. The effect of sudden temp. changes was measured on 6-cm. cubes. These were heated 1000°C and chilled in water. They were then heated to 1200°C and cooled by blowing cold air upon them. This treatment was repeated until the brick could be broken with the hands. This study showed that carborundum brick were most resistant to spalling. Brick containing carborundum and highly aluminous brick ranked next in their resistance to spalling. The brick least resistant to spalling were those containing coarse particles of silica and silica brick.

H. G. S.

Brick and block making plant for the Kailan Mining Administration, China. ANON. *Iron and Coal Trades Rev.* (London), 108 [2], 916(1924).—An article with plan drawings describes a plant recently supplied by Messrs. Wm. Johnson & Sons, Ltd. (Leeds), to the Kailan Mining Administration, China, for making stiff-mud, fire and silica brick. Complete description of special and regular machy., processes, capacities, and burning is given. The installation includes machy. for production of furnace blocks up to 14 in. sq., liners, hex. stove bricks, socketted sewer pipe, etc.

R. D. L.

PATENTS

Artificial magnesia spinel and process of manufacture. FRANK J. TONE. U. S. 1,448,010, May 22, 1923. The process of making magnesia spinel, which consists in electrically smelting a mixt. contg. magnesia and alumina and a reducing agent at a temp. sufficient to fuse the ores and reduce a portion of the impurities in the ores to metallic form, allowing the fused product to cool, and separating the metallic impurities.

Sagger structure. FRANK J. TONE. U. S. 1,448,011, May 22, 1923. In sagger construction, a refractory structural supporting member, containing a material other and stronger than sagger material.

Quartz working. EDWARD R. BERRY. U. S. 1,482,455, Feb. 5, 1924. A quartz working apparatus comprising the combination of a rotatable form or mandrel, means for delivering thereto a strip of plastic quartz, means for rotating said mandrel while feeding



and the amount of bonding agent being sufficient to permit bonding of the granules at the temperatures of an open-hearth furnace.

Bonded articles of magnesia and alumina. R. C. PURDY, M. F. BEECHER and A. A. KLEIN. Can. 229,902, Mar. 27, 1923. A refractory consisting of cryst. MgO and cryst. Al_2O_3 bonded together with $\text{MgO} \cdot \text{Al}_2\text{O}_3$ is prep'd. by mixing preshrunk MgO grains with finely divided Al_2O_3 and heating the mixt. below the fusion point of the latter to form $\text{MgO} \cdot \text{Al}_2\text{O}_3$ sufficient to bond the mixt. together. (C. A.)

Refractory containers for molten metals. E. W. HALE. Can. 229,316, Mar. 6, 1923. The lining of a container for molten metals consists of bricks contg. at least 30% Cr. The oxide film formed on the surface of the lining protects the lining from corrosion. (C. A.)

Refractory cement. W. F. ROCHOW. Can. 229,684, Mar. 20, 1923. A compn. for refractory cement contains powd. SiO_2 rock, calcined SiO_2 and dry powd. Na_2SiO_3 . (C. A.)

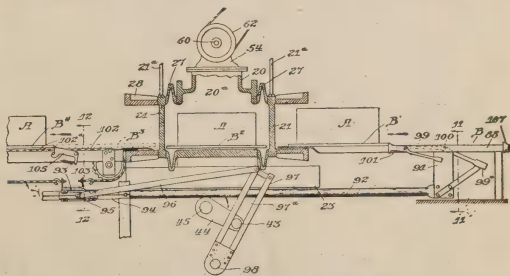
Dolomite refractories. C. A. LONGBOTTOM, F. L. DUFFIELD and W. J. REES. Brit. 191,412, July 4, 1921. Refractory products composed of dolomite are sealed against hydration after firing by immersion in molten wax, tallow, dehydrated oils or fats, or similar substances. Clay and either Fe_2O_3 or slag may be added to the dolomite in the preferred proportions of 2-10% of Fe_2O_3 and 2-15% of clay; or 2-10% each of slag and clay. The mixt. is molded into bricks and shrunk by heating to about 1500°. (C. A.)

Bricks and insulating stones. C. P. AASTROEM. Swed. 50,731 and 50,732, Jan. 18, 1922. A certain species of calcareous earth called "bleke" (found on the isle of Gothland in the Baltic) is passed through a fine-meshed screen, dried in the air and ground finely and then mixed with a binding substance. The latter is formed by mixing burned, finely ground "bleke" with ordinary cement. Then water is added and the mass is worked and pressed to blocks of suitable sizes and shapes, which are finally dried and hardened in the air. (Cf. 2 following abstrs.) (C. A.)

Insulating composition. C. P. AASTROEM. Swed. 50,733, Jan. 18, 1922. The material "bleke" (cf. above) is screened, dried and finely ground and mixed with glue water to a thick paste, which is dried and ground very finely. It is then mixed with burned, ground "bleke," clay, cement and coir. (C. A.)

Porous insulating material. T. A. EKLUND and C. G. LOEFVEBERG. Swed. 51,192, Mar. 8, 1922. A porous insulating material is formed by mixing "bleke" (cf. above) with cellulose. The cellulose may be partly replaced by other fibrous materials from which the incrusting substances are not removed, for instance peat fiber, peat dust, algae, straw, wood pulp, etc. (C. A.)

Machine for making terra-cotta blocks. MAJOR E. GATES. U. S. 1,482,646, Feb. 5, 1924. A machine for pressing plastic material into molds comprising a chamber having openings at opposite sides thereof, doors movable to close said openings, a valve for admitting a combustible mixture to said chamber, means for igniting said mixture after said doors and valve are closed, means for inserting molds into the chamber through one of said openings and means for withdrawing molds from the chamber through the other openings.



Rough-surfaced architectural pottery. ICHIRO YOKOI. Japn. 43,328, Aug. 23,

1922. Green bodies made of feldspar, granite and bog Fe ore are put in a sagger, with small spaces between them. The sagger is then filled with powd. calcined quartz. By firing it to a temp. a little below the m. p. of the body mottled wares with rough surface are obtained.

Roofing-tile kiln. TATSUJIRO KISHIMOTO. Japn. 43,050, July 11, 1922. A roofing-tile kiln has 3 chambers arranged so as to form an arch, the middle chamber being built over the passage between the other 2. The waste gases of the lower chambers are made to pass through the middle one.

Whitewares

Apparatus to determine the compression strength of insulators. H. HECHT. *Tonind. Ztg.*, 52, 90-1(1924).—A small inexpensive hydraulic testing machine for measuring the compression strength of insulators is described. H. G. S.

Tube water colors. HANS WAGNER. *Farben-Ztg.*, 28, 779-81(1923).—A review of the compn. and properties of aquarelle and tempera colors, especially of the desirable properties imparted to the colors by the colloidal action of slight variations in the compn. of the vehicles. Different pigments require sp. proportions of gum arabic in the vehicle to produce pastes that will not gelatinize, will not sep. on addn. of H_2O , nor produce streaky films on application, etc. The quantities of gum required for various pigments are tabulated. This quantity is dependent on the sp. gr. and degree of dispersion of the pigment. Products such as glycerol, glycol, and especially ox-gall, act as protective colloids thereby reducing the quantity of gum required, and improving the keeping qualities of the pastes in the tubes. F. A. W. (C. A.)

Apparatus and Equipment

Grate bar standardization. H. KUPPERS. *Trans. Feuerungstechnik*, 12 [8], 57 (1924).—Discusses the need of standardization among the estimated quarter of a million different types of grate bars. The German Standard Grate Bar Co. has taken as a basis the Schmidt changeable grate design and established a table of standards protected by patents. A single pair of these grate bars can be assembled so as to furnish an air space of 2, 4, 6, 8 and 10 mm. and experience has shown that these variations will take care of the efficient combustion of any fuel. F. A. W.

Granular carbon resistor furnaces. M. M. AUSTIN. *Ind. Eng. Chem.*, 16 [2], 156(1924).—Two types of granular carbon resistor furnaces are described, in which some disadvantages of others of this type have been overcome and the construction simplified. Method of construction and operation of both vertical and horizontal furnaces, illustrated by dimensional drawings is given. It is thought these will prove satisfactory where a cheap and efficient resistor furnace is required. R. D. L.

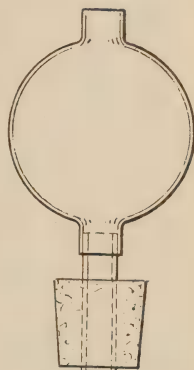
Furnace settings and refractory cements. F. J. WAKEM. *Ind. Eng. Chem.*, 15 [9], 893 (1923).—Chief causes for failure of furnace settings are described and remedy for each is given. Failures include plastic deformation, melting, spalling, cracking and bulging and slagging, beside the human element of poor workmanship. Special mention is made of clinkering and correct arch design. W. thinks proper selection of good refractory cements will prevent most of these troubles, if properly used. R. D. L.

Measuring viscosity. BRITISH ENGINEERING STANDARDS ASSOCIATION. *Iron and Coal Trades Rev.* (London), 108 [2], 101(1924).—The British Engineering Standards Association has issued Publication No. 188, 1923, dealing with the "British Standard Method for the Determination of Viscosity in Absolute Units," the object of which is to provide an accurate yet simple and commercially applicable method for the detn.

of viscosity of a liq. in C. G. S. units. It includes stand, dimensions for U-tube, co-axial bulb and falling sphere viscosimeters and the stand, liq. recommended for their calibration. The use and calibration of the instruments is described in detail, as well as methods for detg. viscosity of opaque liq. by means of the Lidstone Viscosimeter and by the adaptation of the tube and falling sphere viscosimeters. Copies of this publication may be obtained from the B. E. S. A., Publications Dept., 28 Victoria St., Westminster, London, S. W.1.

R. D. L.

A reliable plant viscosimeter. MARTIN MARASCO. *Ind. Eng. Chem.*, **16** [2], 172 (1924).—This consists of a rubber bulb, a rubber stopper and a piece of glass tubing, assembled as shown in the sketch. The app. is dropped into the liq. to be tested and the time reqd. for submergence is a measure of viscosity. Method of calibration is given and also method for converting time in sec., using this viscosimeter, to centipoises, if it is desired to use it with different sp. gr. Advantages claimed by the author are: (1) The capillary is down in the liq. whose visc. is being measured; (2) only ordinary skill is reqd. to use it correctly; (3) it is practically unbreakable; (4) a high degree of sensitivity can be secured by selecting tubing of suitable bore; (5) it is applicable to opaque solns.; (6) it is inexpensive and easily cleaned; (7) it is always replaceable. M. states that a metal bulb and tube may be substituted, for liq. harmful to rubber.



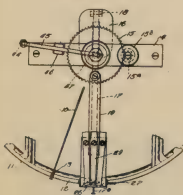
R. D. L.

Electrical precipitation of solids in stack gases. SCHROEDER. *Feuerungstechnik*, **12** [10], 73 (1924).—Describes the new Oski method of electrical precipitation, the operation of which it is claimed is cheap enough to warrant consideration in the recovery of comparatively low value residues such as coal dust, etc. The apparatus is based on the theory that air in an electrical high tension field deposits its suspended solids. Instead of passing the gases between two oppositely charged electrodes as is done in most other types of electrical precipitators a wire mesh electrode of single polarity is used and a second electrode made of a semiconductor in the form of a plate and grounded is used in conjunction with it. This produces ionization and precipitation of the dust particles. A current of 40–70,000 volts and a few milliamperes is used. Advantages claimed for this system are: (1) Smallest and most uniform current consumption; (2) even current distribution through the gases; (3) remarkable high percentage of precipitation in comparison with other type apparatus; (4) cheaper installation and running expenses.

F. A. W.

PATENTS

Regulator. GUY M. HAFFER. U. S. 1,482,791, Feb. 5, 1924. In an elec. pyrometer for fur. a galvanometer having an oscillating needle, a pin carried by said needle, a ledge over which said pin oscillates, a member having a plurality of plungers slidably mounted therein, said plungers overlying the path of said pin, means for periodically depressing said member to cause said pin to actuate one of said plungers, an electric circuit having a switch which may be closed by one of said plungers as it is actuated, and means operable by said circuit for varying the temperature of said furnace.



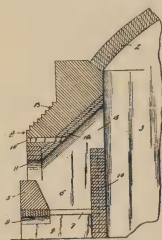
Kilns, Furnaces, Fuels and Combustion

Producer practice and reaction speed. H. V. JUPTNER. *Trans. Feuerungstechnik*, **12** [7], 49 (1924).—Discusses theory of combustion in gas producers and the attaining

of a status of equilibrium represented by the equation $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$. The reaction $2\text{CO} = \text{CO}_2 + \text{C}$ takes place extremely slowly but the reverse reaction is comparatively rapid. Condition approaching equilibrium is attained in practice by increasing time of contact between the elements of combustion by (1) reducing gas velocity, (2) increasing depth of fuel bed. Speed of reaction is increased by (a) higher concentration of gases, (b) increase in temp., (c) use of catalytic agent.

F. A. W.

PATENTS

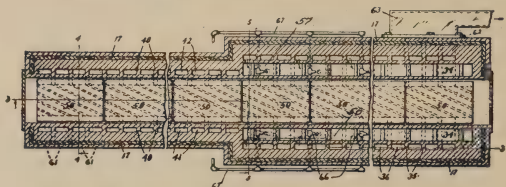


Kiln. IKE BIVINS. U. S. 1,486,359, Mar. 11, 1924. In a kiln, a pottery chamber having a top, an inclined arch extending to a point adjacent the upper end of the pottery chamber, a front wall having an opening therein arranged below the arch, a fire box below the arch, and a vertical baffle wall arranged between the fire box and the pottery chamber and extending above the opening, the crown being provided with a horizontally arranged sight opening

above the baffle wall.

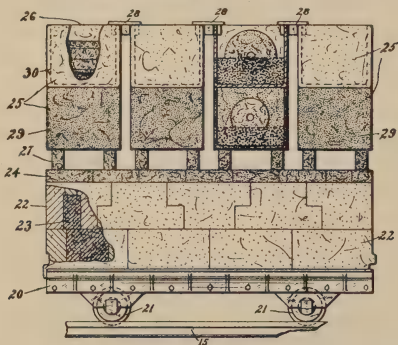
Muffle tunnel kiln. THURE LARSSON. U. S. 1,485,118, Feb. 26, 1924. A tunnel kiln comprising outer walls defining a kiln chamber for conveying ware therethrough, a combustion chamber within the kiln arranged longitudinally thereof, means providing an air conduit adjacent the combustion chamber, and means for positively circulating air through said conduit to absorb heat from the combustion chamber and transfer it indirectly to the ware.

Tunnel kiln. HUGO W. H. BETH and MILTON F. BEECHER. U. S. 1,485,109, Feb. 26, 1924. In a tunnel kiln having longitudinal muffle benches

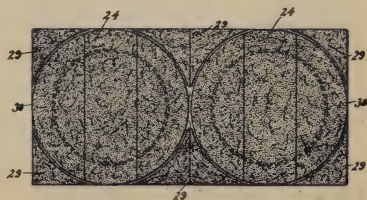


in the heating chamber and a car traversing passage therebetween, the combination therewith of a car comprising a wheeled support, an imperforate refractory body portion thereon having a plane top disposed substantially on a level with said benches, small refractory blocks of high heat conductivity spaced on said car top so as not to obstruct the transverse flow of gases and stacks of refractory containers disposed on said blocks in spaced relation transversely and longitudinally of the car.

Tunnel kiln. HUGO W. H. BETH. U. S. 1,485,110, Feb. 26, 1924. A tunnel kiln

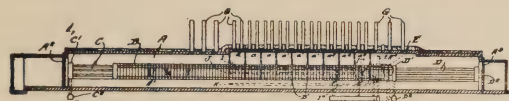


comprising a movable kiln car platform, a refractory turntable mounted thereon to rotate in a horizontal plane, a plane-surfaced layer of superrefractory material on said table to support the ware, a refractory superstructure supported upon said movable platform partially surrounding said turntable at the sides to form a car body having a substantially solid top, and means for rotating the turntable while the car is within the tunnel kiln.



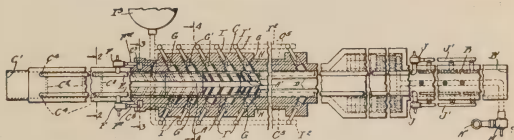
Method of and apparatus for glazing and decorating. CONRAD DRESSLER. U. S. 1,484,116, Feb. 19, 1924. In the method of firing and glazing ceramic ware of such character that gases and vapors are distilled therefrom during an initial stage of the

glaze firing operation which detrimentally affect the glazing operation, if allowed to contact with the ware in a subsequent stage of the glazing operation, the improvement which consists in passing the ware continuously through an elongated kiln chamber so heated that the ware is gradually raised in temperature to the final temperature desired, restricting the flow longitudinally of the kiln chamber of the gases and vapors driven out of the ware and withdrawing said gases and vapors from the kiln chamber.



Method of and apparatus for bluing porcelain. CONRAD DRESSLER. U. S. 1,484,117, Feb. 19, 1924.

In a muffle heated continuous kiln the combination with a kiln chamber and the muffle heating means therefor, of means for injecting fluid into a localized portion of the kiln chamber to make the atmosphere in that portion of the chamber either oxidizing or reducing as desired.



Continuous tunnel kiln.

CONRAD DRESSLER. U. S. 1,484,118, Feb. 19, 1924. In a continuous tunnel kiln, the combination with a kiln chamber having side walls formed with burner chambers therein, of provisions for supplying air and fuel to said burner chambers, and nozzle members formed of carborundum and connecting said burner chambers to the interior of the kiln chamber.

Geology

Chinese kaolin for American potteries. ANON. *Far Eastern Rev.*, 18, 511-4 (1922).—There are unworked deposits of good kaolin in Kwangtung and Manchuria.

W. H. A. (C. A.)

Australian pottery clay. II. ANON. *Bull. Imp. Inst.*, 21, 321-4(1923); cf. *ibid.*, *Imp. Inst.*, 19, 465(1921).—Tests for the manuf. of semi-porcelain or impermeable stoneware were carried out with clay from Bendigo, Australia, contg. SiO_2 59.70, Al_2O_3 24.85, Fe_2O_3 1.45, TiO_2 nil, CaO nil, MgO 1.37, K_2O 2.30, Na_2O 1.66, loss on ignition 8.88%, in conjunction with feldspar contg. SiO_2 65.34, Al_2O_3 19.96, Fe_2O_3 0.47, TiO_2 nil, CaO nil, MgO 0.60, K_2O 7.96, Na_2O 4.44, loss on ignition 0.56%, and with massive, milky white quartz consisting of practically pure SiO_2 . The results showed the clay to be quite suitable; but the working properties under industrial conditions should be detd. The compn. of the clay from this locality apparently varies considerably in different parts of the deposit.

A. P.-C. (C. A.)

China clay. V. BODIN. *Science et industrie*, 7, No. 108, 134-6(1923).—Comparison of English and French china clays and their respective methods of extn. and treatment.

A. P.-C. (C. A.)

Chemistry and Physics

The preparation of artificial zeolites. PAUL EYMAEL. *Le Ciment.*, 29, 4-6(1924).—There are a number of artificial products that have similar chem. properties to those

possessed by the natural zeolites, which are hydrous double silicates of alumina and a basic group. The indus. importance of the zeolites lies in the property that the basic group has of being easily displaced by another basic group. In water purification, by passing the water through a column of zeolite grains, the calcium in the water displaces the sodium group in the zeolite, thus softening the water. The lime in the zeolite is later removed by displacing it with a sodium group derived from a brine soln. Application has also been found in the extn. of alkalis from sugar soln., and in a number of chem. transformations. *Methods of prepn. (I.) Fused method.*—Such material as kaolin and quartz are fused with soda and feldspar, and the product leached with water. The granular residue when dried and ground to size is ready for use. "Permutit," $2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{Na}_2\text{O} + 6\text{H}_2\text{O}$, is made in this manner. The German firm "Permutit A. G." has improved on the water washing process of the fused mass, which ordinarily breaks down some of the granules, for the alk. solns. obtained in the washing produce silicic acid by dissolving the granules, thus undermining the cohesion of the grains. This destruction has been prevented by adding silicic acid in the form of commercial sodium silicate, $1\text{Na}_2\text{O} \cdot 3\text{--}5\text{SiO}_2$, to combine with the alkali set free. *Wet methods.*—(1) The English Co. "Water Softeners Ltd." operates along the following lines: to a soln. of sodium sulphate, 2.5 kg. in 50 l. of water, are added with stirring 844 cc. of a soln. of sodium aluminate contg. 45.6 g. alumina, and 315 g. of a soln. of sodium silicate contg. 79 g. silica. The flocculent ppt. is decanted, washed with water and concd. by filter pressing. After drying and grinding the material is ready for use. (2) Another wet process is that of "The Refinite Co." A suitable clay contg. besides hydrated aluminosilicates, oxides of sodium or potassium, or their equiv. in calcium or magnesium, is made into a slip and treated with concd. sodium chloride soln. It is thus converted into an hydrated double silicate of aluminum and sodium. The mixt. is treated with excess sodium hydroxide, which dissolves free silica, sodium silicate and alumina, converts the acid double silicates into the sodium compds., and produces a fairly hard product easy to handle. After grinding the mass is crushed and dried for 48 hrs. at atmospheric temp., for 24 hr. at $100\text{--}200^\circ$, then calcined at 700° . On cooling, the product is allowed to become completely hydrated in a soln. of an alkali metal. (3) In the Brun process, a caustic soda soln. is added to a soln. of an aluminum salt, until the ppt. formed is just dissolved; then water sol. salts of sodium, as the phosphate, sulphate, chloride, are added. Finally a soln. of sodium silicate is added and the mixt. brought to a boil. The ppt. is washed, dried and calcined; it is also known as permutite. L. N.

The transverse strength of refractory clays. LARCHEVEQUE. *Brit. Clayworker*, **32**, 293 (1924).—Tests were made on bars approximately 10 in. by $\frac{1}{6}$ in. by $\frac{1}{2}$ in. supported on knife edges 8 in. apart. It was found that: (1) Fire clays, china clay, porcelain bodies, etc., all bent much more in the raw state than in the fired state. A bar which had been fired 10 times, bent less than another which had only been fired once; (2) a clay mixed with grog bends more than the same clay mixed with sand; (3) the clay which bends least when mixed with grog also bends least when mixed with other non-plastic materials; (4) the increase in transverse strength produced by mixing Nemours sand with clay is significant; and (5) the cohesion of clays examined, both in the raw and fired state, was greater with mixtures of clay and sand than with plain clay. H. G. S.

Measurement of surface tensions. ALLAN FERGUSON. Fifth Report on Colloids, etc., *Brit. Assoc. Adv. Sci.*, **1923**, 1–12.—F. stresses the importance of surface tension and reviews recent work on the detn. of (1) *contact angles*, (2) *surface tension at liquid-gas interface*, (3) *interfacial tensions*. J. A. (C. A.)

Some artificial barium aluminium silicates. A. S. GINZBERG. *Coll. scientific papers dedicated to F. Y. Levinson-Lessing*, Petrograd, **1915**, 34 pp.; *Mineralog. Abstracts* **2**, 153.—The system $\text{CaAl}_2\text{Si}_2\text{O}_8\text{--BaAl}_2\text{Si}_2\text{O}_8$ is studied. Excess of $\text{BaAl}_2\text{Si}_2\text{O}_8$

crystallizes as uniaxial, + hexagonal plates, corresponding with nephelite. Mixed crystals with up to 20% $\text{BaAl}_2\text{Si}_2\text{O}_8$ were obtained. 2V diminishes from 80° for anorthite to 68° for the 20% mixed crystals, but the optical orientation is only slightly affected. E. F. H. (C. A.)

The influence of hydrogen peroxide on the precipitation of zinc salts with sodium metasilicate. A. H. ERDENBRECHER. *Z. anorg. allgem. Chem.*, **131**, 119-29 (1923).—The ppts. produced by Zn salts and Na_2SiO_3 in the presence of H_2O_2 contain O in amts. which vary with the concn. of H_2O_2 . These substances are not definite compds. but consist of mixts. of ZnO_2 and H_2SiO_3 , together with some ZnSiO_3 . With ZnCO_3 , peroxides with a max. O content of 12.1% are formed. The ZnSiO_3 once formed is not changed by H_2O_2 . The H_2O_2 procedure may be used as a means of detecting ZnO_2 in the presence of ZnSiO_3 . J. A. A. (C. A.)

A note on the theory of specific heats. E. CSASZAR. *Z. Physik*, **19**, 213-20 (1923).—C. summarizes the results of Debye. A new formula for the sp. heats of solid substances is derived, departing from the classical theory in that it is assumed that a crit. energy limit exists, below which the atom gives up energy discontinuously, and above which classical continuity exists. This leads to a finite series for sp. heats, instead of the infinite series of Debye's formula. Sp. heats calcd. with this formula upon Ag and Cu are compared with those calcd. by Debye's method and with exptl. results. There is good agreement. J. H. P. (C. A.)

Compressibility of minerals and rocks at high pressures. L. H. ADAMS AND E. D. WILLIAMSON. *J. Franklin Inst.*, **195**, 475-529 (1923).—Detn. was made of the compressibility of a no. of minerals and igneous rocks under hydrostatic pressures as high as 12,000 megabars; the specimen was completely surrounded by kerosene, and subjected to pressure in a thick-walled steel bomb. The compressibility usually decreased slightly as the pressure was increased; although the change was so small for the less compressible minerals that it escaped detection. In certain expts., porous rocks were covered with a thin jacket of pure Sn to prevent the kerosene from entering the pores; in these expts., at pressures above 2000 megabars, porosity had little effect on the compressibility. The more porous rocks, however, may show an abnormally high compressibility at low pressures. Except for very low pressures, the compressibility of a holocrystalline rock may be calcd. from the known compressibilities of its constituent minerals. The compressibility usually increases with increasing basicity. Of the igneous rocks, quartz and metallic Fe are the two extremes of compressibility. In any given class of rocks, variation in compressibility at high pressures is small and due almost entirely to variation in compn., while variation at low pressures is much larger and depends chiefly on the degree of compactness. At 10,000 megabars the compressibility per megabar is approx. 1.9×10^{-6} for a typical granite and 1.2×10^{-6} for a typical gabbro. At this pressure, the rigidity of granite is 0.3×10^6 megabars, gabbro 0.5×10^6 , dunite 0.6×10^6 ; the rigidity of the earth as a whole probably is approx. 0.9×10^6 , a value higher than that of the most rigid silicate rock, this being doubtless produced by the pressure of a few hundred miles of rock on basic or ultrabasic rock. With increasing basicity, the velocity of the longitudinal vibrations, which are transmitted through the earth, increases from 5.6 km. per sec. in granite to 7.4 km. per sec. in dunite. Their initial velocity is slightly above 7 km. per sec. corresponding to a gabbro or a pyroxenite and showing the presence of basic or ultra-basic material at a comparatively small distance beneath the surface of the earth. J. S. H. (C. A.)

Properties of powders. The variation of pressure with the depth in columns of powders. J. H. SHARBY AND J. C. EVANS. *Trans. of Faraday Soc.*, **1923**.—Measurements of the (average) vertical pressure pa at various depths x in columns of lead shot and of powder indicate exponential increase of p with x . The absolute value of the

pressure appears to be dependent on the state of packing of the column and the resulting shape of the equal pressure surfaces; if so the observations supply grounds for inferring that a difference in packing sets in from the start, it being possible, after taking the first pressure reading to predict fairly accurately the value of the maximum pressure. The general form of the pressure-depth curve agrees well with the equation pa equals $pm(1 - Ce^{-kx})$ in which pm is the maximum pressure and C and k are constants. The apparatus used was described and results are given which check closely with the calculated values.

F. C. F.

PATENTS

Process of separating the constituents of mineral silicates. JOHN B. LARUE and SHERMAN W. SCOTFIELD. U. S. 1,483,627, Feb. 26, 1924. In the process of converting potash-feldspar into potassium silicate and aluminate by means of converting crystalline feldspar into amorphous feldspar and heating a mixture of said amorphous feldspar and a solution of caustic potash in a closed vessel, the step of converting silicic acid into silica which consists in continuing the heating until the moisture is absorbed by the crystalline mass, resulting in a material reduction of the pressure and a material increase in the temperature.

Manufacture of chrome alum. PETER HASENCLEVER. U. S. 1,486,961, Mar. 18, 1924. The process for manufacturing chrome alum which consists in dissolving ferrochrome in a non-oxidizing mineral acid capable of dissolving ferrochrome, precipitating from the solution chromium hydroxide, the iron remaining dissolved, separating the chromium hydroxide from the liquid, dissolving the chromium hydroxide in sulphuric acid, adding potassium sulphate and crystallizing.

General

The packing of earthen ware. C. M. BONNELL, JR. *China, Glass and Lamps*, 43 [26], 11(1924).—Breakage in pottery during shipment is very often due to the method of packing. Efforts to improve packing have generally been rather unsuccessful. The U. S. Potters Assoc. granted 25% more wages to do this, but without effect. Piece work was tried, but was even worse. An example was given to show the cost of hurrying up. A large mail order house uses a conveyor system. Frequent thorough inspection has made their packing problem a minor one. They also use excelsior instead of straw. It is slower to pack, so the packers object when on a piece work wage. However, excelsior goes further than straw, which helps to reduce the ultimate price of the excelsior. Very often a few poor workmen give the rest of them a bad reputation, but the good ones do not feel that they can conscientiously report them. Figures are given showing the effect of variation in the moisture content of the staves used for barrels and indicating that proper seasoning is necessary. Wet packing material, either by sprinkling to keep down dust, or when wet after packing, is a very bad practice as the material swells and then shrinks away from the ware.

F. C. F.

Electrical conductivity of solid and fused silicates. C. DOELTER. *Rec. Trav. chim.*, 42, 720-32(1923).—A few silicates conduct at ordinary temp. Results on condy. and polarization of fused silicates are given. Electrolytic condy. is often present, even in solids. Nearly all silicates conduct at 1000°C.

W. M. C.

Franco-Belgian Association for testing materials. Session of June 23, 1923. H. C. *Rev. Mat. Constr. Trav. Pub.*, 166, 165-7(1923).—Petrographic study of refractory clays, clays for cements, and limestones, Bied and Jourdain. Clays after drying were heated slowly between 30° and 40° in a tinned iron crucible with a mixture of Canada balsam and benzene for many hours until hardened. The hard mass is then cut up into thin sections, polished and mounted on glass slides, according to the established

technique for obtaining petrographic rock sections. Clays can be grouped as follows: cryst. kaolinite and halloysite, amorphous or colloidal, allophane and collyrite.

L. N.

A new mechanical fuel feeder. ANON. *Brit. Clayworker*, **32**, 312(1924).—Illustrations are shown of a new stoking appliance for feeding coal into a Hoffmann kiln.

H. G. S.

Producer-gas and gas-producer practice. VII. R. V. WHEELER. *Fuel*, **2**, 369-72 (1923); cf. *C. A.*, **18**, 458.—The subject is concluded under the following headings: efficiency of a gas plant, gross and net calorific values, efficiency trials, radiation losses, losses due to sensible heat of the product, losses due to unburned fuel and the choice of fuel for gas producers.

C. C. D. (*C. A.*)

Electric furnace types surveyed. L. W. EGAN. *Iron Age*, **112**, 1283-6(1923).—Discussion of the advantages and disadvantages of the arc, resistance, and induction furnaces for foundry use. Elec. furnaces out-class the best combustion furnace practice except in installation cost. The arc type is most rapid in action, has largest capacity per unit; the muffled arc is a large heat source at comparatively low temps.; Baily resistance furnace gives greater metal temp. uniformity; Ajax induction has low power cost and low metal cost. Induction furnaces are ideal electrothermic units, but are not suitable for steel. The resistance furnace excels with dirty charges. Melts can be made better and cheaper in resistance furnaces than in combustion furnaces.

C. L. M. (*C. A.*)

Advances in ceramics. W. FUNK. *Chem.-Ztg.*, **47**, 673-5, 701-3, 718-9, 734-6, 742-4(1923).

E. J. C. (*C. A.*)

Ceramic industries in England. A. S. W. ODELBURG. *Svensk. Kem. Tids.*, **35**, 247-66(1923).—A descriptive and historical article.

A. R. R. (*C. A.*)

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CERAMIC ABSTRACTS

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the Editor of *Chemical Abstract* by cooperative agreement.

Abrasives

Corundum abrasive wheels (Transvaal). F. J. TROMP. *S. Af. Jour. Indus.*, **71**, 27(1924).—Total amt. of Transvaal corundum produced in 1922 was 2,024 T., almost the whole amt. being used for prod. of abrasive wheels. Transvaal corundum is obtained in a very pure form (from 95–98% Al_2O_3), owing to the fact that it occurs in the form of comparatively large crys. of nearly pure alumina, which can be readily separated from the accompanying gravel or enclosing rock. There seems no reason why these valuable deposits should not be the basis of an important industry, provided an export market can be obtained. The industry is discussed under various heads—grits, grades and bonds, glazing and loading, the making of a wheel, speed tests; grinding tests and railway grinding tests, with illustrations and statistics. O. P. R. O.

PATENT

Method of purifying silicon-carbide crystals. CLARENCE J. BROCKBANK 1,488,311, Mar. 25, 1924. The method of purifying silicon carbide crys. or grains that consists in treating the carbide with a solution of a metallic subs. capable of replacing the impurities with its contained metal.

Art

Deposition of metals on glass and ceramics. SAMUEL WEIN. *Met. Indus.*, **23**, 532(1923).—There are 3 methods of depositing metals on non-conducting surfaces. *First method.*—An adhesive (gum, resin, or similar compound) is dissolved, into which are stirred such conducting elements as graphite or metallic powders, or both. This process is the cheapest. The results are quite permanent if done carefully, but with time the deposited metal has a tendency to peel. The process is readily prepd. by dissolving ordinary orange shellac in alcohol to the consistency of thin paint: to this is added graphite (free from oil and grit) or bronze powder or both; this may be applied to the surface by hand or air brush. If the designs are not too fine in detail, paper stencils may be used to advantage. This is placed away to dry (about 1 hr.), proper elec. connections made thereto, and it is ready to be copper-plated. A copper-cyanide soln. is the best for the "strike," and after a while it may be transferred to the ordinary copper-sulphate soln. *Second method.*—A metal or metallic salt is mixed with a flux, and this is applied to the surface and then subjected to heat, the object being that the metallic salt is converted into the metal and at the same time fused into the surface proper. This process is by far the best, and at the same time most permanent. It is difficult to remove, once the metal is fused into the surface. In this process "metallized silver" is first made, by adding 1 part nitric acid to 6 parts of water, and one ounce of metallic silver. When the silver is all dissolved it is diluted with several times its bulk of water. Insert a piece of copper; after a time the silver will be pptd. on the copper in the form of white flakes, the silver is then collected, dried and prepd. for use. It is best powdered or ground in a mortar and pestle, or in a paint mill. The formula used by Pottier (first to use metallic silver and a flux) consisted of: silver 75 pts., lead borate 25 pts. These are ground together in a paint mill with a little essence of turpentine and oil of neat's-foot. This compd. is applied to the surface and fired in a kiln. Dimes recommends: silver 1 oz., mercuric oxide 1 dwt. The formulas in the following tables have all been tried and give good results.

Gold may be used instead of silver for deposition; dissolve it in aqua regia, 1 pt. of nitric acid to 3 pts. hydrochloric acid, great care must be taken as these fumes arising are extremely poisonous. When the gold is dissolved, gold chloride in soln. is the result. Metallized gold must be pptd. from this soln.: divide the soln. equally and pour into 4 tumblers, to each add twice its bulk of clear distilled water. Dissolve some ferrous

| 1 | |
|------------------------------|--------------------|
| Silver chloride (fused)..... | 1 oz. |
| Lead acetate..... | 1 dwt. |
| Soda ash..... | 1 dwt. |
| Potassium nitrate..... | $\frac{1}{4}$ dwt. |
| Boracic acid..... | $\frac{1}{4}$ dwt. |
| Borax..... | $\frac{1}{4}$ dwt. |

| 3 | |
|-----------------------------|-----------|
| Flint glass (powdered)..... | 6 grains |
| Lead oxide..... | 6 grains |
| Potassium nitrate..... | 24 grains |
| Borax..... | 6 grains |
| Boracic acid..... | 12 grains |
| Silver chloride..... | 1 oz. |

| 2 | |
|------------------------------|--------|
| Silver chloride (fused)..... | 1 oz. |
| Lead borate..... | 2 dwt. |
| Potassium nitrate..... | 2 dwt. |
| Borax..... | 1 dwt. |

| 4 | |
|------------------------|--------|
| Silver chloride..... | 4 oz. |
| Boracic acid..... | 4 dwt. |
| Potassium nitrate..... | 4 dwt. |
| Flint (powdered)..... | 4 dwt. |
| Glass (powdered)..... | 4 dwt. |
| Soda ash..... | 4 dwt. |
| Lead oxide..... | 4 dwt. |
| Borax (calcined)..... | 8 dwt. |

sulphate in hot water, add the green soln. until a pptn. takes place; the gold will be found on the bottom of the tumbler in the form of a brown powder, when dried and the necessary amt. of flux added, is ready for use. In pouring off the original soln. a slight residue of alloy remains. When the ppt. of gold has been completely extracted, water may be poured off and the brown powder collected and dried, when dried pass through a fine sieve or silk muslin. Due to coarseness of the metal it is difficult to secure even deposits. To overcome this coarseness, prepare a soln. of gold chloride, to this add an excess quantity of potassium hydroxide soln. A ppt. will form; on the addn. of an excess of the alkali the ppt. will immediately redissolve. To this add a soln. of mercurous nitrate until no further ppt. forms. The ppt. is sepd. from the soln. and washed, and then treated with an excess of nitric acid (to dissolve the mercurous salts formed in the ppt.), and then thoroughly washed in running water. By this method the gold is left in an exceedingly fine amorphous condition; it is dried and ready for use. The following is used to great advantage: silver chloride, 1 oz.; gold, 5 dwt.; bismuth nitrate, 40 grains; glass (powdered), 1 dwt.; borax, 18 grains. Platinum can also be used. *Third method.*—The last of the processes is accredited to Marino. This is usually done by applying two or more layers of sodium silicate (water glass). This is best done by dissolving 1 pt. of sodium silicate (sp. gr. 1.27) in 2 pts. water. This is applied as the first coat, and the second coat consists of equal pts. of sodium silicate and water. The surface is brushed over with a soln. of silver chloride 100 pts. dissolved in 140 pts. of a saturated soln. of potassium cyanide to which is added 60 pts. of ammonium fluoride. The silver chloride film is reduced to metallic silver by applying a soln. of 100 pts. hydrazine sulphate dissolved to saturation. To this is added 60 pts. sodium hydroxide or carbonate. The method of procedure is to apply the silver soln., then the reducing soln., and finally submit to friction caused by a rapidly rotating brush. The article thus treated is then ready to be deposited with copper or other metals in the usual manner.

O. P. R. O.

Apparatus for the determination of color in terms of dominant wave-length, purity and brightness. IRWIN G. PRIEST. *J. Opt. Soc. Am.*, **8**, 173–200(1924).—Details of the design of the app. are given together with directions for its use and data on its accuracy. Tests showing that homogeneous and white brightnesses are strictly additive for the wave-lengths and purity values considered are included.

D. E. S.

Luster and its measurement. H. SCHULZ. *Textilber.*, **5**, 25–7(1924).—The Goerz "glanzmesser" compares the normal and diffuse reflection of light from a standard

source. Polarization luster-measuring devices require adjustment to the refractive index of the material examd. The device may be used on *artificial silk, paper*, etc.

E. R. C. (C. A.)

Electrodeposition of antimony. J. C. GHOSH AND A. N. KAPPANA. *J. Phys. Chem.*, **28**, 149-160(1924).—A bath suitable for plating Sb on a large scale is made up by adding Sb_2O_3 to a boiling aq. soln. of $33\frac{1}{3}\%$ tartaric acid to satn., filtering, and then adding 30% HCl. High c. ds. can be employed (50 milliamps. per cm^2); current efficiency runs up to 97%. With oil of bergamot as addn. agent a thin adherent deposit of Sb has been obtained which could be polished to a silvery appearance. G. and K. point out that in a HCl soln. of tartar emetic or Sb tartrate Sb is deposited by the direct discharge of Sb^{+++} ion.

A. C. Z. (C. A.)

BOOK

HOUSTOUN, R. A.: **Light and Color.** London: Longmans, Green & Co. 179 pp. 7s. 6d. (C. A.)

Cement, Lime and Plaster

Exposure tests on colorless waterproofings. Bur. Stand., *Tech. Paper 248; Concrete*, **24** [3], 123(1924).—See p. 191 for this abs. F. T. H.

Rubber lined ball mills in mining and cement industries. ANON. *India Rubber World*, Dec. 1, 1923; *Concrete* (Mill Sec.), **24** [3], 47(1924).—After months of practical test it was demonstrated that the innovation of the rubber lining gives results superior to any of the metal and rock linings previously used in ball mills for grinding very hard ore and gangue rock. The grade of rubber recommended is that used for the tread of automobile tires. While sufficiently hard to resist wear, it has enough resiliency to cause the steel balls or other grinding medium to rebound upon impact in such manner as to avoid disintegration of the liner surface. Also the rebounding action produces a very marked increase in pulverizing efficiency. A method of applying the rubber slabs is covered by U. S. patent No. 1,470,597. F. T. H.

What we may expect to do with aluminate cement. HENRY S. SPACKMAN. *Concrete*, **24** [3], 88-90(1924).—Aluminate cement in France sells at the mills for between $2\frac{1}{2}$ and 3 times the price of Port. cement. All the mills mfg. aluminate cement are over-sold. The economies possible in proportions, labor, forms and time offset the increased cost of the cement. F. T. H.

Cementing Qualities of Calcium Aluminates. ANON. Bur. Stand., *Tech. Paper 197; Concrete* (Mill Sec.), **24** [3], 46(1924).—Additional copies of this paper have been printed. It gives the data obtained from test pieces made of eight different cements of this type. The Bureau is doing further exptl. work with aluminate cements. F. T. H.

Recommended specification for quicklime and hydrated lime for the manufacture of silica brick. ANON. Bur. Stand., *Circ. 153*.—A brief description of the way in which lime is used in the manuf. of silica brick is followed by a general statement as to the quality of lime required. The standard of quality is set at 92%, based on the non-volatile matter, with maximum limits of 5 and 10% carbon dioxide, depending upon whether the sample is taken at point of shipment or of destination. Complete directions for sampling and testing are included. H. F. S.

Rapid slaking of lime. J. E. DUCHEZ. *Rev. Mat. Constr. Trav. Pub.*, **164**, 80-2; **165**, 104-7; **166**, 127-30(1923).—In slaking burned lime contg. silica and alumina just sufficient water is added to slake the lime but not enough to hydrate any silicates or aluminates. The quantity of water to be used can be calcd. from the empirical formula, per cent water by wt. = $c - 1.7(a + b)/3$, in which the chem. compn. in wt. per cent is a SiO_2 , b Al_2O_3 and Fe_2O_3 , c CaO and MgO . The formula is derived from the follow-

ing considerations. The compds. formed from SiO_2 , Al_2O_3 and CaO in making hydraulic cements are mainly, $\text{SiO}_2 \cdot 2\text{CaO}$, $\text{SiO}_2 \cdot 3\text{CaO}$, $\text{Al}_2\text{O}_3 \cdot 3\text{CaO}$ and free CaO . In burning lime with mol. compn. $x \text{ SiO}_2$, $y \text{ Al}_2\text{O}_3$, $n \text{ CaO}$, granting that the above compds. are formed, the max. and minimum free lime left for hydration will be: (a) $x(\text{SiO}_2 \cdot 2\text{CaO}) + y(\text{Al}_2\text{O}_3 \cdot 3\text{CaO}) + [n - (2x + 3y)]\text{CaO}$; (b) $x(\text{SiO}_2 \cdot 3\text{CaO}) + y(\text{Al}_2\text{O}_3 \cdot 3\text{CaO}) + [n - 3(x + y)]\text{CaO}$. As the free lime only should be hydrated, the limits for the water content are: $[n - (2x + 3y)]\text{H}_2\text{O}$ and $[n - 3(x + y)]\text{H}_2\text{O}$. Converting the per cent chem. compn. of the lime into mol. ratios gives, $0.93a \text{ SiO}_2$, $0.55b \text{ Al}_2\text{O}_3$, $1c \text{ CaO}$. Substituting these values, the limits in wt. per cent are $\frac{1}{3}[c - (1.80a + 1.65b)]$ and $\frac{1}{3}c - [(2.80a + 1.65b)]$; the fraction $\frac{1}{3}$ being the ratio of water to lime used for slaking theoretically pure lime. Equalizing the factors in the max. limit gives the empirical formula. The calcd. values agree with the quantities used in practice:

| Lime from— wt. per cent compn. | Tarn. | Aude. | Cantal. | Basses-Alpe |
|---|-------|-------|---------|-------------|
| SiO_2 | 4.5 | 0.75 | 16.32 | 25.21 |
| Al_2O_3 and Fe_2O_3 | 3.1 | 0.32 | 4.00 | 1.32 |
| CaO and MgO | 91.94 | 97.70 | 77.58 | 72.00 |
| Water of hydration, wt. per cent | | | | |
| Calcd. from formula..... | 26.04 | 31.29 | 14.34 | 8.96 |
| Used in practice..... | 25 | 32 | 15 | 10 |

Lime crushers, hydration systems and storage bins are described with special reference to installations made by the author. L. N.

Calcium chloride and concrete. ANON. *Nature*, **113**, 441(1923).—Three valuable processes for improving concrete have resulted from recent scientific study; hardening after setting with a dilute soln. of silicate of soda; the addition of mechanically slacked lime to the cement; and the use of calcium chloride for "curing" and also for mixing cement. With regard to the curing of cement, concrete requires to set in a continually moist condition in order to give the best results. For this reason, therefore, curing consists in keeping it wet either by covering with water or spreading over it damp soil or earth which is moistened continually. This is an extremely costly, laborious, and tedious job in case of a long stretch of road and is often not particularly efficient. The calcium chloride treatment consists in spreading the powdered material over the road as soon as it has set at the rate of $2-2\frac{1}{2}$ lb. per sq. yd.; its deliquescent properties keep the surface continually moist without any trouble, the net saving in cost being very considerable. Calcium chloride is beginning to find a use for mixing with the cement, in the propn. of about 3%, which results in a much quicker hardening of the concrete for given strength and a final increase in the compressive strength, although the matter in this respect is somewhat complicated because, for some unknown reason, different cements do not react to some extent. O. P. R. O.

Cement industry—Portland and Kandos (New South Wales). R. H. CAMBADGE. *Chem. Eng. and Min. Rev.* (Melbourne), **16**, 153(1923).—The cement industry may be relied upon for 1924, as the value for 1923 was so high action has been taken toward establishment of additional cement works. O. P. R. O.

Exposure tests on colorless waterproofing mats. Bur. Stand., *Tech. Paper* **248**. D. W. KESSLER.—Tests to det. the rel. effectiveness and durability of several colorless waterproofing mats. H. F. S.

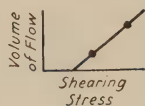
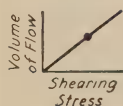
PATENT

Dampening the kiln gases before the electric precipitation of the flue dust. DALEN PORTLAND CEMENTFABRIK. Norw. 37,660, Aug. 20, 1923. The gases pass through a chamber the walls of which are sprinkled with the necessary amts. of water.

C. H. A. S. (C. A.)

Glass

New method of cutting glass. ANON. *The Glass Worker*, 43 [26], 15(1924).—From the *Scientific Amer.* Large sheets of glass are cut in a new machine which has



two cutters for scoring the glass on both sides at identical lines. The glass comes apart with no ragged edges. No allowance for gaging is necessary. R. J. M.

On the physical properties of glass. F. ECKERT. *Jahrbuch der Radioaktivität und Elektronik*, 20 Band Jahrg., 1923; Heft 2/3, pp. 94–275; Leipzig Verlag von S. Hirzel, 1924.—This vol. contains nearly 200 pp. describing and discussing the phys. properties of glass. Detailed subjects, General Glass Lit.; Optical Glasses and their Optical Constants; Dispersion of Optical Glass; Absorption of Optical Glass; Absorption of Colored Glass; Effect of Absorbed Energy; Relation of Refractive Index to Composition, Pressure and Temp.; Reflection and Elliptical Polarization; Electro and Magneto Optics; Electrical and Magnetic Properties; Density and Thermal Expansion; Thermal and Molecular Properties; Elastic Properties; Behavior of Glass at High Temp. W. M. C.

The influence of light and temperature on the change of color in the production of colorless glass in tank furnaces with special reference to the use of selenium. W. E. S. TURNER and A. COUSEN. *Pottery Gaz.*, 49, 445–49(1924).—Previous exptl. (cf. *Ceram. Abs.*, 2 [5], 94; 3 [3], 96) work had been done by the authors with regard to the effect of color of the glass of the various substances employed in batches for the production of a selenium decolorized glass. A standard batch of the compn. 100 pts. sand, 37 soda ash, and 20 lime spar was used as a basis, with variations by replacing a small propn. of the soda ash by its equiv. either of salt cake, sodium nitrate or of borax. Meltings were made in crucibles at temp. about 1370–1380°C. It was found, that by using an amt. of selenium such as normally employed in decolorizing, viz., $\frac{1}{2}$ oz. per 1000 lb. of sand and keeping Fe_2O_3 content of the glass from 0.4% to 0.6% the glasses obtained in 3 hrs. melting were either decolorized or pale yellow with no certainty of color. Additions of arsenious oxide to the batch, and 3 hrs. melts under above conditions were made, which resulted in the production of glasses in which no yellow color was present. Where selenium was used in large excess, arsenious oxide contg. glasses gave a faint pink coloration. Sodium nitrate when substituted for some of the soda ash, gave glasses much deeper in color than those obtained without its use. There was no difference in appearance between borax and a simple soda lime glass. A period of $8\frac{1}{2}$ hrs. melting was then employed with following results. (1) Simple soda lime glasses, which, at the end of 3 hrs. were decolorized, or pale yellow, after $8\frac{1}{2}$ hrs. were deep yellowish brown. (2) Glasses in which a small amt. of salt cake displaced some of the soda ash, and which were decolorized after 3 hrs. or at most faintly yellow with prolonged heating became definitely green in color, the color being that due to iron oxide. (3) Arsenious oxide glasses, decolorized or practically so, after 3 hrs. were decolorized even after heating for $8\frac{1}{2}$ hrs. (4) Sodium nitrate batches became very deep brown in color when heated for the longer period. (5) Again, sodium selenite melts, which were somewhat deeper in color than those in which selenium itself was employed at the end of 3 hrs. differed little from these when long period meltings were tried. The amt. of selenium remaining in the glass was detd. and the following relationships found: (1) In all cases when salt cake was employed the amt. of selenium remaining was very small, so small as to be impossible of estn. by the method used. (2) With arsenious oxide glasses, the amt. of selenium retained was of the same order as with simple soda ash glasses. (3) With sodium nitrate batches the amt. of selenium retained was of a much larger order, and it seemed obvious that the amt. of the substance remaining in the glass was dependent upon the rate of melting of the batch, for it was clear that sodium nitrate batches melt more readily than

equiv. batches in which soda ash only is employed. It appeared in all cases so far examd. the element when in the glass did not become oxidized to selenite, but remained as selenium, its color being developed slowly as the result of continued heating. It therefore seems from the results obtained that the only stabilizing substance tried was the arsenious oxide, the salt cake tending to eliminate the selenium from the glass. Glasses were exposed to sunlight for a period of a year and two distinct results were obtained depending upon initial appearance, *i. e.*, whether deeply colored or practically free from color. The deeply colored glasses were distinctly bleached by the exposure, while the decolorized or faintly colored glasses became slightly yellow. Pink glasses obtained by use of selenium and arsenious oxide, also with selenium and sodium nitrate upon annealing became distinctly paler after 8 hrs. at 525°C, after 3 hrs. at 550°C and even at 1 hr. at 575°C.

J. W. H.

The art of table and domestic glass making. F. A. PERRY. *Pottery Gaz.*, **49**, 267-73(1924).—An address bearing upon the processes in the making of glass for domestic use.

J. W. H.

Simplified practice recommendation No. 10—milk and cream bottles and bottle caps. ANON. Bureau of Standards.—Representatives of the International Milk Dealers Assn., The Glass Container Assn., the Cap Mfrs. Credit Assn., and the National Assn. of Bottle Mfrs. met in a general conference at the Department of Commerce on April 26, 1923, to det. upon recognized sizes of milk bottles and milk bottle openings. The conference unanimously recommended three sizes of milk bottles for quarts, pints, and half-pints, respectively, with one size opening for the entire group. Before this constructive step milk bottles were manufd. in 12 sizes for quarts, 13 sizes for pints, 14 sizes for half-pints, 10 sizes for quarter-pints, and approx. 10 sizes of caps were required to fit this varied assortment.

H. F. S.

Operating glass tanks—heat requirements of the batch-efficiency. BJARNE SCHIELDROP. *Fuels and Furnaces*, **1** [1], 43(1924).—The third of a series of articles on heat balances of glass tanks, dealing with ht. requirements and efficiencies of the batch. After batch has been introduced in the tanks, the sequence of events is assumed to be as follows: 1. Raw mats. are htd. to fur. temp. 2. Fluxes not entering into the glass, are dissociated. 3. Silicates are formed by the sand and the parts of the fluxes remaining in the bath. 4. Glass resulting from item 3 is fused. 5. Gases escaping from the batch are cooled to stack temp. 6. Glass is cooled to working temp. The amt. of ht. reqd. to melt the batch varies with the following factors: 1. Compn. of the batch mixt. 2. Temp. at which glass is withdrawn from tanks. 3. Stack temp. Using these items, a table is given showing eff. of fur. with def. wts. of raw mats. and temps. Items 5 and 6 are found from tables showing amts. of ht. given off in cooling 1 lb. of glass from 2600°F to temps. varying from 1500°F to 2400°F (working temp.) and cooling 1 lb. of gases given off from the mat., from 2600°F to temps. varying from 500°F to 1200°F (stack temp). The eff. figured is on the basis of fuel consumption given in a preceding article (Dec. 1923). The author points out that reductions in stack- and glass-withdrawal temps. result in increased eff. on account of decreased fuel consumption that overbalances the corresponding decrease in items 5 and 6. Before batch calcns. can give constructive information as an aid to design and opern., they must be available over a period covering both good and bad "runs." Well-designed and operated window glass tanks should show eff. of around 10 per cent. If below 6%, a strenuous effort should be made to det. cause. Flint or bottle glass tanks may reach 20% eff., but is commonly around 10 or 12%. A mere statement of fuel consumed per lb. of raw mat. is no indication of eff.

R. D. L.

Canadian Glass Co. (new process). A. A. ICENHORN. *Indus. Canada*, **24**, 84 (1924).—The Canadian Glass Co. is to start operations shortly at Amherstburg, Ont.,

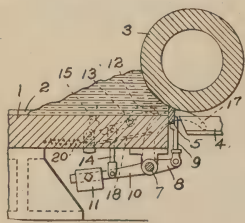
mfg. plate glass by a newly invented process, the work of A. A. I. It involves a great saving in production costs over previous methods. By it the glass will be drawn by a special machine directly from the melted batch. When drawn to the proper dimension, the plate is automatically passed to a leer, where it is annealed, and it is then ready for shipment. The rate of production is one sheet every 25 min. No grinding or polishing is necessary. The process has been tested experimentally and the company is now building a machine of commercial size at a cost of about \$250,000. The factory is situated near an almost unlimited supply of silica sand. O. P. R. O.

The art of sealing base metals through glass. WM. G. HOUSEKEEPER. *Jour. Am. Inst. Elec. Eng.*, **42**, 954-60(1923).—Four distinct methods of sealing metals to and through glass are described: (1) the flattened wire seal for small electrical conductors; (2) the ribbon seal for special purposes; (3) the disk seal for commercial manufacture of seals for carrying currents of the order of 100 amp.; (4) the tube seal, in which metal and glass tubing are joined together. The method consists in providing a large surface of contact between the glass and the metal, and in so proportioning the cross section and contour of the metal that the stresses resulting from the difference in coefficients of expansion are less than the ultimate strength of the joint between glass and metal. Since the metal (copper) is under tension, due to its greater contraction on cooling, it follows that heating of the conductor will relieve the stress, and in this way it is possible to pass sudden currents as great as 1200 amp. through a disk seal. A. F. G.

Unsplinterable glass. ANON. *Indus. Aust. and Min. Standard*, **7**, 224(1924).—A description of the processes and manuf. of the commodity known as "Triplex Safety Glass" used extensively for the wind shields of automobiles. While it is tougher than ordinary glass, it is not unbreakable, but is unsplinterable, which is its chief virtue. As a result of impact tests it was proven that while the glass was covered with innumerable cracks, no single piece was detached. France was the original home of the product, but the British product is now superior. A description of the process of mfg. is given by mentally following a piece of glass through the works. The special features of this process are the specially prepared adhesive with which the two sheets of glass are coated and the uniting of the glass sheets with a sheet of celluloid by means of hydraulic pressure. Great care and skill is required in the manuf. and expensive mats. are the only ones practical, but the many years of experiment have resulted in a product, the advantages of which are obvious. O. P. R. O.

Annealing of glass. H. V. MALLISON. *Science Progress*, **18**, 473-6(1924).—Mathematical evidence is offered that glass may be annealed in 2 ways. It may be annealed quickly at a relatively high temp. and cooled slowly; or it may be annealed slowly at a relatively low temp. and cooled quickly. J. S. H. (C. A.)

Unbreakable and malleable glass. E. BERGER. *Naturwissenschaften*, **12**, 79-83 (1924).—A review dealing with the physics involved and with past attempts to produce glass highly resistant to mech. and thermal fracture. C. C. D. (C. A.)



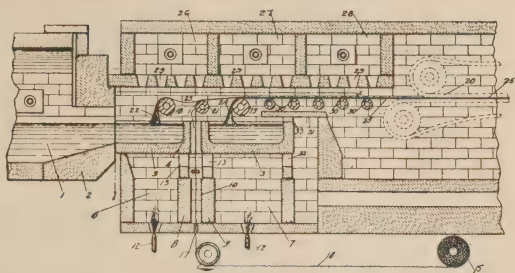
PATENTS

Casting table. ALBERT E. EVANS. 1,488,911, April 1, 1924. In combination with a glass casting table, a stop member mounted for vertical movement up and down across the edge surface of the table at one end thereof, and adapted in one position to be withdrawn below the upper surface of the table, and in another position to extend above such upper surface and form a stop for the molten glass cast

upon the table, a roll mounted for movement from a position directly above the stop member to the other end of the table and means for moving the member up and down.

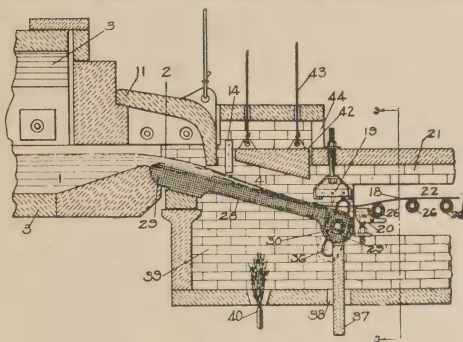
Composition for producing glass. ALEXANDER L. DUVAL D'ADRIAN. 1,489,026, April 1, 1924. A composition for producing glass, comprising the constituents of the usual glass bath, and the natural double silicate of sodium and calcium known as pectolite.

Method and apparatus for drawing wire glass. JOSEPH P. CROWLEY. 1,489,822, April 8, 1924. An apparatus for making wire-glass comprising, a receptacle containing molten glass, a pair of spaced parallel cylindrical cooled rollers mounted closely above the surface of the molten glass, means for feeding up a sheet of wire mesh at a point between the rollers, and a third roller intermediate the other two over which this wire is bent, a drawing mechanism for drawing up a mass of molten glass over each of the first rollers, and drawing a sheet horizontally from these masses, the sheet from one roller passing first over the intermediate roller and uniting with the wire, and then over the second roller and uniting with the glass drawn from the second mass of molten glass, to form a sheet of glass with the wire embedded therein, and means for directing heat against both faces of the sheet to insure the union of the several constituent parts.

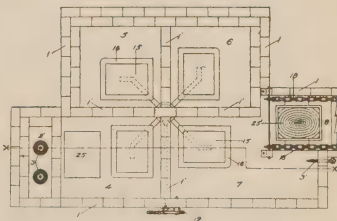


Drawing continuous sheet glass. JOSEPH P. CROWLEY. 1,489,823, April 8, 1924. An apparatus for drawing sheet glass, comprising a tank containing molten glass, a

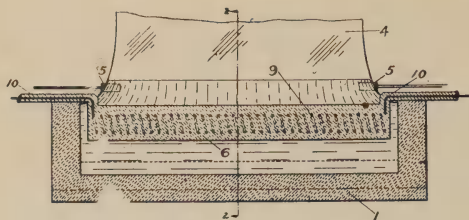
graphite drawing slab pivoted to the tank outlet so that the molten glass flows out onto the slab, a cooled supporting shaft for the free end of the slab, means for adjusting the shaft vertically to vary the inclination of the slab, a heating chamber beneath the slab, the front wall of the chamber being vertically adjustable with the slab, means for cooling the glass while on the slab, and means for stretching the glass into sheet form while on the slab.



Rotating glass-molding device. FRANK AUCREMANNE. 1,489,729, April 8, 1924. In combination with a four-chamber, glass heating furnace, of the character described, a rotating, glass-molding device, having a centrally located, stationary, base hub; a vertical journal guide, upon the upper surface of said hub; a rotating hub member, adapted to pivotally engage the guide journal of the stationary hub, and adapted to rest and rotate upon the upper surface of the stationary hub, by means of ball bearings; a plurality of carrying arms, rigidly attached to the rotating hub, and means for rotating said hub and arms, within the heating chambers, substantially as described.



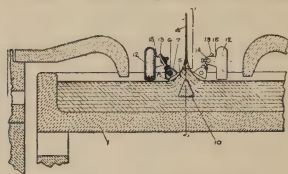
Drawing continuous sheet glass. JAMES WHITTEMORE. U. S. 1,489,875, April 8, 1924. In an apparatus for drawing sheet glass from a mass of molten glass, a



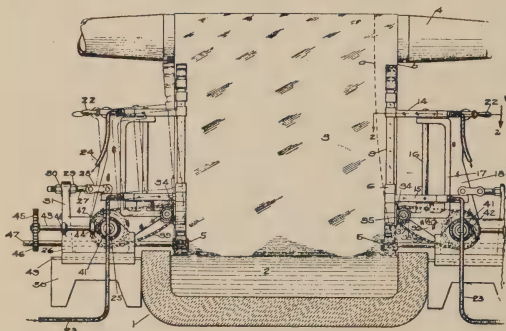
wedge-shaped member of refractory material, located within the molten mass with its edge tapering toward the line of generation of the sheet, and an electric heater enclosed within the refractory member.

Drawing sheet glass. JAMES WHITTEMORE. U. S. 1,489,876, April 8, 1924. In a sheet glass drawing

apparatus, a receptacle containing molten glass, means for drawing a sheet therefrom, a cooling bar submerged in the glass beneath the meniscus, and electric heaters extending across each face of the sheet near the base of the meniscus.

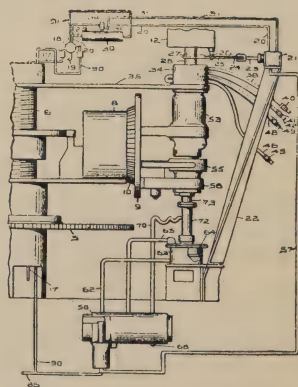


Drawing continuous sheet glass. CLIFFORD A. ROWLEY. U. S. 1,489,852, April 8, 1924. In combination with a source of molten glass, and means for drawing a sheet of glass therefrom, a pair of guide loops, a series of grippers freely slidable on each loop, a driven sprocket for feeding the grippers around the lower arc of each loop into engagement with the



sheet, an idler sprocket for enforcing uniform movement of the grippers around the upper arc of each loop, a frame yieldingly holding the loops and grippers, one against each side of an edge of the glass sheet, means for cooling the loops, a supporting base to which the frame is pivoted, and means for angularly adjusting the frame about its pivot to vary the inclination of the guide loops with respect to the line of travel of the glass sheet.

Molten-glass charge supply. FRANK O'NEILL. U. S. 1,490,182, April 15, 1924. Means providing a downwardly continuously flowing laterally peripherally exposed stream of molten glass, a normally open shear, means for operating the shear for severing the stream of glass into slugs, a guide in the line of the stream, therebelow and approximating in cross-sectional area the cross-sectional area of the stream, for receiving the slugs, an annular series of molds successively movable into registering position with the guide, suction means coacting through a guide registering mold, and control means for the shear and suction means for at once accelerating the slug as it is severed for travel through the guide into the mold therebelow.



Heavy Clay Products

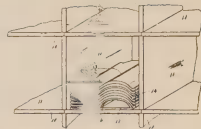
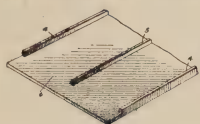
Making sewer pipe the modern way. STAFF ARTICLE. *Brick and Clay Record*, 64, 492-96(1924)—. Description of new plant of Cannelton (Ind.) Sewer Pipe Co. Numerous photos of equipment accompany the article.

J. W. H.

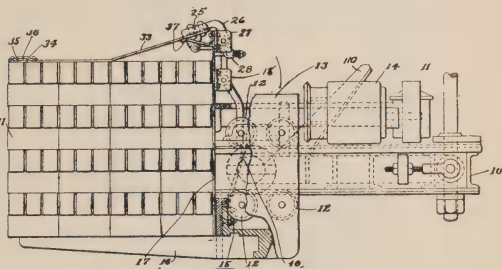
PATENTS

Method of and means for burning tiles. ARTHUR W. BROWN. 1,489,694, April 8, 1924. A method of burning tiles having arch portions, consisting of arranging the tiles in loose bundle-like portions in a kiln and supporting the arch portions thereof during baking of the tiles.

Brick pallet. JAMES H. McFEELY. U. S. 1,490,119, April 15, 1924. A rolled metal pallet for use in the manufacture of bricks having a longitudinal stiffening rib along each side thereof and a longitudinal stiffening rib along the center thereof, said ribs terminating short of the pallet ends so as to provide supporting slideways.



Clamping device for brick-handling machines. GRAFTON E. LUCE. U. S. 1,490,898, April 15, 1924. In a clamping device for brick handling machines, the combination of a stationary plate, a clamp pivotally mounted thereon and extending forwardly thereof, a movable frame adapted to carry a load or pile of bricks and located beneath the clamps, and means on said frame for operating the clamping device to clamp a load or pile of bricks on the movable frame.



Refractories

The story of refractories.

ANON. *Science*, 59 [1525], 275 (1924).—A motion picture film

made by the Bureau of Mines is loaned free to technical societies, commercial organizations, colleges, schools and churches. Applications should be addressed to Department of the Interior, Bureau of Mines, Pittsburgh, Pa.

C. J. H.

Refractories. G. M. GILL. *Colliery Guardian*, 123, 91(1922).—The variation in size and quality of firebricks, blocks and retorts is one of the most unsatisfactory features users of refractories have to meet. To solve the difficult problems arising from varying length, width, and thickness of fire bricks, the author suggests that dimensions of retorts should be, within practical limits, the same from end to end, internally and externally; the internal dimensions affect the discharging operations, the external dimensions affect the building of the settings, much cutting of bricks and blocks being necessary where the retort is of bad shape. What appears to the author as necessary in the conduct of firebrick works is the institution of methods providing for: (1) The continuous sampling and analyses of mixts. in use, both chem. and phys. (2) The use of heat recorders in kilns. (3) Definite limiting standards for size and shape. (4) Guaranteed working to specifi. The control proposed would doubtless effect the production of a higher and a more consistent quality of brick. Control would further diminish rejected bricks, save fuel costs in kilns, increase capacity of plant and effect improvements which would entail from increased knowledge of the process.

O. P. R. O.

Silica brick works of the Consett Iron Co. ANON. *Colliery Guardian*, 126, 1163 (1923).—A detailed description of this plant for manuf. of silica bricks and shapes for the construction of the new installation of Willputte coke ovens now being erected at Consett. The raw material—ganister—is mainly composed of silica in the form of quartz with a density of 2.650. The "Consett" silica shapes contain about 30 per cent tridymite and never more than a trace of unconverted quartz; hence this practically com-

plete conversion guarantees absence of either permanent or after expansion. The article has illustrations of the works and details of construction. O. P. R. O.

Silica bricks in coke oven construction. J. ENZENAUER. *Colliery Guardian*, 121, 565(1921).—Two batteries of ovens built, the one in 1915 of silica bricks (SiO_2 95%, CaO 2%) and the other one year later of ordinary coke oven siliceous bricks (SiO_2 80%, Al_2O_3 16%), are described by E. in Glückauf. The higher thermal conductivity of the silica brick was recorded in a shorter coking period, 24 hrs. as against 29 hrs. in the latter battery. In spite of the initially unpromising texture and brittleness of the silica brick walls, they are now in the better condition of the two. The siliceous bricks are more extensively corroded by salt and more worn by erosion. The walls of silica brick are less susceptible to fusion or deformation due to unskilled attention. The yield of by-products may possibly be adversely influenced in the silica brick construction, but this does not outweigh the advantages of increased output of good coke and of gas. The fact that higher temp. may be maintained in flues of silica brick without damage to the walls may be a temptation to shorten the coking period at the expense of by-products, but the rise in heat consumption finally renders such practice uneconomical. O. P. R. O.

Graphite, 1919-1921. *Imp. Min. Res. Bureau*, 16 pp.(1923).—The world's production of graphite, imports and exports for United Kingdom, Canada, Ceylon, India, Australia, France, Germany, Italy, Sweden, Madagascar, U. S., and Japan, are given in this statistical report, with prices and bibliography. O. P. R. O.

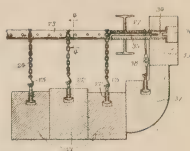
The casting process for glass refractories in German glass tank process. K. ENDELL. *Pottery Gaz.*, 48, 1964-67(1923).—The principal advantages of the casting process compared with older methods of making pots by hand are (1) a very homogeneous mixt. of the raw clay and grog is obtained, which results in a close texture after firing; (2) unskilled labor is employed in place of highly rated men. The process is not only used for the casting of pots but also for producing large tank blocks and slabs. The difficulty arising in a wider adoption of the process lies in the discovery of suitable casting clays. The suitability of a clay for casting depends upon the possibility of obtaining with the clay and grog mixt. a pouring consistency suitable for casting by the addn. of about 0.25% alkali and 18 to 20% water calcd. on dry wt. of the mix. Many clays which are suitable for making glass pots require too much water to produce a casting slip, for example, Grossalmerode pot clay and Belgian crucible clay from Ardenne region. The difficulties with these clays are due principally to sol. salts such as sulphates. Work is now in progress on freeing clays of sol. salts by electrolysis. In certain clays fluidity can be improved by a small addition of sulphate lye. No difference in refractoriness could be detected in Seger cones between cast and hand made pots, and no perceptible difference was noted between the 2 methods when tested for ability to withstand load at elevated temp. Introduction of finely divided quartz as such or in the form of raw china clay into fire clay mixts. increases the rigidity of the fire clay at high temp. Cast pots are approx. 25% denser than hand made pots, which gives preference to cast pots in melting special glasses such as heavy barium glass which attack fire clay readily. The porosity of cast pots gave values between 19 and 22% whereas hand made pots of the same clay approximated between 24 and 26%. Success of the casting process depends upon careful and trained supervision, proper selection and preliminary treatment of clay. J. W. H.

Intrinsic values of refractory coatings. H. M. CHRISTMAN. *Fuels and Fur.*, 2 [1], 71(1924).—A summation of the destructive forces attacking the refractory and a means of prolonging its life. Coating refractory linings with efficient refrac. cements is suggested to increase furnace efficiencies by preventing corrosive and erosive actions of furnace gases, flames and sand and dust particles, rotting and spalling. R. D. L.

PATENT

Arch construction for furnaces. FRANK B. BIGELOW. 1,488,660, April 1, 1924.

In a fur. arch structure, the combination of an arch-plate, an arch-plate brick mounted thereon, a brick arch having a border brick at least in part over said arch-plate brick, and means supporting said border brick from above and capable of permitting variation in the contactual relation of such arch-plate and border bricks.



Whitewares

Note on the so-called kaolin of Djebel Debar. A. A. GRANGER AND P. BREMOND. *Trans. Ceram. Soc.*, **22**, 283-285.—In view of the whiteness of the mat., it might be considered valuable in china and earthenware making, but its want of plasticity is a serious drawback in the molding, profiling and casting processes. It should be added to the body in limited quantities only, since it would be incorrect to substitute this halloysitic mineral for china clay. The most serious inconvenience is the necessity to crush the clay with water in a stone or roller mill, the disaggregation with water in the blunger being absolutely ineffective. H. F. S.

The production of earthenware from the biscuit state, including the various stages of decorating. EDMUND SHENTON. *Pottery Gaz.*, **48**, 1947-60(1923).—Abstract of lecture dealing with various kinds of underglaze decoration of English earthenware, viz., sponged ware, band and line printing, the function of hardening kilns. Other topics discussed are underglaze litho, preparation of glaze, dipping, glost placing, glost fire, sorting, liquid gild on glaze printing, hand painting, lithographing on glaze band and line in colors and in gold, ground laying, aerographing, enamel kiln fire and placing. J. W. H.

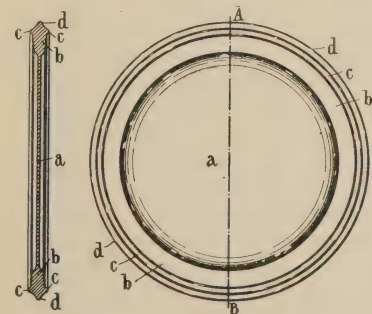
A century of Staffordshire pottery. WALTON STANLEY. *Pottery Gaz.*, **48**, 1960-63(1923).—An address. J. W. H.

Earthenware biscuit firing. A. G. RICHARDSON. *Pottery Gaz.*, **49**, 273-75(1924).—In the early stages of firing, up to approx. 450°C, an ordinary earthenware body loses 2% of its weight, this loss in weight is almost entirely due to the evaporation of combined water. At 500°C the loss in weight is 3%; at 550°C, it is 5%; at 600°C, it is 6% (the loss now being due to the C as well as moisture) and at 900°C the loss is 7%. No perceptible change in dimensions of the ware occurs until about 1000°C, when contraction takes place rapidly, the contraction at this temp. is approx. 1 1/2%; at 1050°C 2%; at 1100°C 4%; and at 1200°C as much as 6%. In ordinary 18 ft. biscuit kiln there is about 10 cwt. of H₂O which must be driven from the ware, and 5 cwt. from green saggars. J. W. H.

High-voltage (porcelain) insulation. J. L. R. HAYDEN AND C. P. STEINMETZ. *J. Am. Inst. Elec. Eng.*, **43**, 36-43(1924). P. D. V. M. (C. A.)

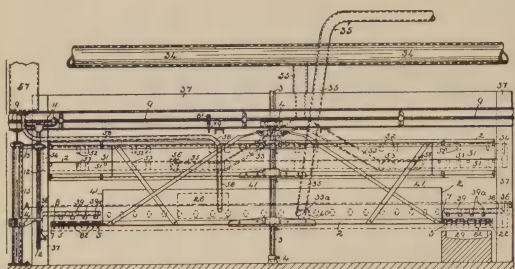
PATENTS

Plate or saucer. EDMUND WILLIAM ABRAM. U. S. 1,488,462, April 1, 1924. A reversible plate or saucer in the form of a one-piece unitary dish dished on both sides thereby to form on each side the food-receiving cavity, said disc having on each side an up-standing bead adjacent its periphery which forms the rim of each dish



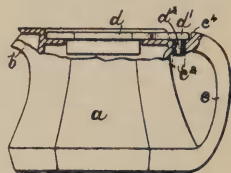
cavity, said disc extending radially beyond said beads and the extended portion having a progressively decreasing thickness and terminating in a peripheral bead which is located in the plane of the common bottom of the two dishes.

Method of and means for manufacturing teacups, breakfast cups, and other vessels or articles of pottery. ELIJAH BROOKES. U. S. 1,488,973, April 1, 1924. In a casting



machine, a frame mounted to revolve on a vertical axis, horizontal mold carriers pivoted in the frame with their pivots arranged radially of its axis, molds arranged in the said mold carriers, and means for tilting the mold carriers on their pivots to discharge surplus material from the molds.

Teapot, coffeepot, jug, and like pouring vessel. JAMES WEBSTER. U. S. 1,489,872, April 8, 1924. In a pouring vessel, a body portion provided with a handle and having a hole at the upper part of the handle and a projection of the handle adjacent to the hole, and a lid disconnected from the body portion and provided with a projection which is slidable vertically in the said hole, said lid having its top portion adjacent to the handle arranged substantially flush with the said projection on the handle.



Equipment and Apparatus

Reduction of blast furnace lining disintegration. H. E. TOWNSEND. *Iron Trade Review*, 74 [3], 232-4(1924).—Linings manufd. in accordance with specif. given by J. W. Gocher showed great reduction in amt. of disintegration. Ferric oxide content was more than 50% lower than usual. Furnace temp. and high CO content in fur. gas were favorable to disintegration. Presence of from 0.10 to 0.15% Zn, in ore mix. substantiates statement by Nesbitt and Bell that "apparently zinc does not cause failure by disintegration." Author states, "ferric oxide content of blast fur. brick must be 50% lower than that of brick usually furnished."

T. D. H.

New cupola furnace. E. SCHURMANN. *Iron Trade Review*, 74 [5] (1924).—Two photographs and one complete drawing are given. Blast is preheated and passes transversely across cupola melting zone. Arrangement of refrac. brick checkerwork conserves heat. Pressure and exhaust fans are used and a substantial saving in coke consumption is claimed.

T. D. H.

Graphite-clay crucibles for steel. R. T. STULL AND G. A. BOLE. *Iron Trade Rev.*, 74 [7], 487(1924).—Crucibles made from Alabama, Canadian, Ceylon, Madagascar, Montana, New York and Texas graphites bonded with various clays and used on commercial scale for steel and brass melting showed some domestic clays superior to Klingenberg clay. Texas, Alabama and Ceylon graphites, in addition to giving longer life to crucibles, carbonize steel less.

T. D. H.

Equalizer app. for transverse tests of bricks. H. L. WHITEMORE. *Bur. Stands., Tech. Paper*, 251.—The A. S. T. M. has described the app. to be used for making transverse tests of bldg. bricks. As this app. is made up of many loose parts, considerable time is required to prep. the specimen for test. A new equalizer app. has been designed, built and tested, which gives practically the same values for the modulus of rupture as the A.S.T.M. app.

H. F. S.

Application of the interferometer to measurements of the thermal dilatation of ceram. mats. GEORGE E. MERRITT. *Bur. of Stands., Sci. Paper*, 485.—In this paper an interference method and app. for measg. the thermal expansion of ceram. mats. are described. The samples in the form of small pins, 0.5 to 10.0 mm. in length,

are placed between two fused quartz interferometer plates and heated in an elec. fur. The elongation of the samples is detd. from the numbers of interference fringes that pass reference marks on the interferometer plate while the sample is being heated. A change in length of the sample of 0.025μ or one-millionth of an in. can be easily detected.

H. F. S.

Simple rules for designing resistors. DUDLEY E. FOSTER. *Fuels and Furnaces*, 1 [7], 529(1923).—Design of special resistor furn. is given for any desired temp. up to 1800°F , using nickel-chromium and nickel-chromium-iron alloy wire. Tables for calc. of radn. and convn. losses and proper size and length of wire for definite power input, are given. Example is shown for calcg. necessary power input for a furnace $4 \times 4 \times 4$ in., inside dimensions, with 4 in. insulation. The article provides simple and definite rules for designing small resistor furnaces.

R. D. L.

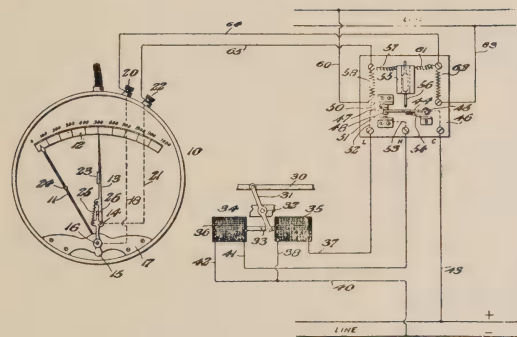
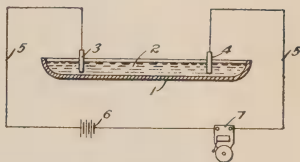
Boilers and engines: How to run them efficiently. J. PHILLIPS. *Trans. Ceram. Soc. (Eng.)*, 22, 286-292.

H. F. S.

PATENTS

Furnace indicator. CHARLES W. HILL. U. S. 1,489,247, April 8, 1924. A furnace indicator comprising resistance material capable of changing its resistance under reducing conditions.

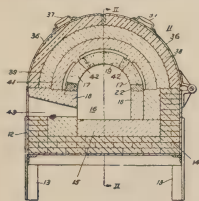
Control thermometer. CHRISTIAN WILHJELM. U. S. 1,489,911, April 8, 1924. In a control system, the combination of a mechanism for controlling the



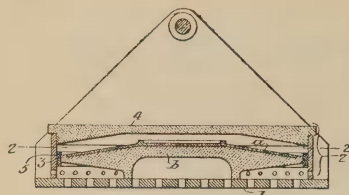
source of heat to a heating zone, a measuring instrument provided with a pointer for indicating the temp. of said zone, a normally energized relay coil, means including a contact arm to cooperate with said pointer when the temp. reaches a predetermined limit to short circuit said relay coil, and means controlled by said relay for operating said mechanism.

Electric furnace. ORA A. COLBY. U. S. 1,490,207, April 15, 1924. In an elec. resistance

fur., in combination, a plurality of refrac. walls enclosing a fur. chamber, heating element located in said chamber and comprising a plurality of curved and parallel-extending refractory members of substantially semicircular accurate extent and having their lower ends supported by certain of said walls, refrac. means located at one end of said curved members for elec. connecting them in series-circuit relation, refrac. means located at the other ends of said curved members for maintaining them in substantially parallel relation, terminal electrodes having one end extending through one of said walls and operatively engaging said heating element, and resilient means for maintaining said electrodes in close operative engagement with said heating element.



Process and apparatus for drying pottery. JOSEPH L. BUCKLEY. U. S. 1,490,765, April 15, 1924. In an app. for drying clay bodies, the combination with a tray, a mold

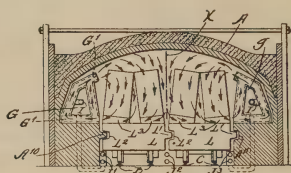


positioned on said tray adapted to support an article to be treated, a metallic ring embracing the periphery of said mold, said ring having one end closed by said tray, and a cover plate of absorbent material for closing the other end thereof, whereby moisture formed on said article, when the same is heated, may be removed.

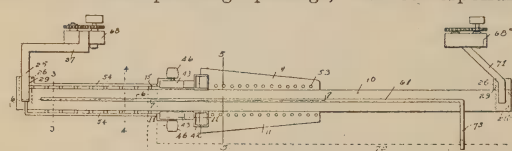
Kilns, Furnaces, Fuels and Combustion

PATENTS

Continuous heating method and apparatus. CONRAD DRESSLER. 1,488,910, April 1, 1924. The method of heating mat. which consists in passing the material in two oppositely moving streams along side by side pathways through an elongated chamber and in subjecting the material in each stream during an initial portion of its travel through the chamber to the action of a set of convection currents of the chamber atmosphere wholly induced by the heat of the adjacent material in the other stream, and to the action of a second set of convection currents of the chamber atmosphere induced by a separate source of heat.



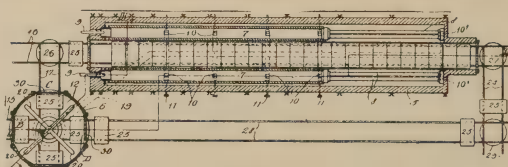
Tunnel kiln. HALVER R. STRAIGHT. 1,489,554, April 8, 1924. In a device of the class described, a tunnel designed to receive a series of movable cars, and to be divided into preheating, burning and cooling zones, and an adjacent and independently constructed furnace at each side of said burning zone, the adjacent wall of each having a series of corresponding openings, each corresponding set of which is provided with a



loosely mounted refractory tube for conducting heated gases from the furnace to the said burning zone. In a device of the class described, a tunnel designed to receive a series of movable cars,

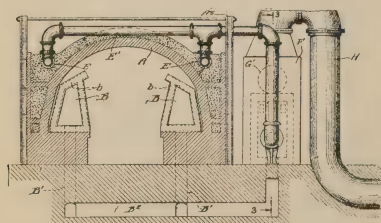
and to be divided into preheating, burning and cooling zones, a car receiving vestibule at each end of said tunnel, mechanical means for feeding air under slight pressure to the cooling end of said tunnel, and mechanical means for simultaneously producing a slight vacuum at the preheating end, both of said means being capable of producing a constant flow of air under a constant pressure and at a uniform velocity.

Tunnel kiln. PAUL A. MEEHAN. U. S. 1,490,396, April 15,



1924. The combination with a tunnel kiln and its heating means, of an independent preheating chamber, together with means for heating the preheating chamber by the hot products of combustion from the kiln heating means.

Tunnel kiln. HARRY M. ROBERTSON. U. S. 1,490,433, April 15, 1924. The combination with a continuous tunnel kiln having



an outlet for products of combustion adjacent its entrance end and a burner inlet at a point remote from the entrance end of the kiln, of a recuperator connected to said outlet and a conduit for passing air preheated in said recuperator to said burner inlet comprising a portion extending longitudinally of said kiln and located above the latter.

Geology

The kaolin industry in Italy and Sardinia. U. ORZALI. *I. Lareizi ed Affini*, 2 [20], p. 21-3(1924).—A description of the location of various large deposits, their extent and grade of kaolin on the deposit. A large number of analyses are of various parts of the formations. The average analysis was: 40-50 Al_2O_3 , 40-50 SiO_2 , 10-15 H_2O - Fe_2O_3 is less than 0.5%. The analyses compared favorably with those of kaolins of other countries. A description of the deposits is geologically given. The process of washing the clay is described with various types and possibilities of the use of these beds of kaolin. S. S. C.

Bauxite, 1919-1921. *Imp. Min. Res. Bur.* (1924); *Min. Indus. of Brit. Empire and Foreign Countries* (1923).—This statistical report, aluminium, including bauxite and cryolite, gives rates of exchange, world's production; imports and exports of United Kingdom; Canada; and U. S.; with prices. O. P. R. O.

Arsenical ores (New South Wales). R. H. CAMBADGE. *Chem. Eng. and Min. Rev.* (Melbourne), 16, 153(1923).—Arsenical mining ore operations have been active at the producing mines, and several promising outcrops in the New England district were located during 1923. A marked increase in the output of arsenic may be expected. O. P. R. O.

BOOK

MILLER, BENJAMIN L., AND SINGEWALD, JOSEPH T., JR.: **Mineral Deposits of South America.** New York: McGraw-Hill Book Co., Inc. 598 pp. \$5.00 net, post-paid. (C. A.)

Chemistry and Physics

A comparison of the heating curves and quenching methods of melting point determinations. G. W. MOREY. *J. Wash. Acad. Sci.*, 13, 326-9(1923).—The heating curve method is compared with quenching method which is used in silicate study. The quenching method is more accurate and by heating curve method the true melting point is on the more rapidly rising portion of the curve. Illustration of results given using sodium metasilicate where the results varied but 2° in 1100°C . S. S. C.

The residue from silica in rock analysis. M. AUROUSSEAU. *J. Wash. Acad. Sci.*, 13, 330(1923).—The residue from the silica determination was analyzed of a andesite of Lassen Peak, Cal. and was found to contain:

| | |
|-------------------------|-------|
| Al_2O_3 | 13.46 |
| Fe_2O_3 | 26.92 |
| MgO | 17.30 |

| | |
|------------------------|-------|
| CaO | 1.92 |
| TiO_2 | 30.76 |
| P_2O_5 | 1.92 |
| SO_3 | 7.69 |

Of which in the original oxides of the rock this was

| | |
|--|------|
| Al_2O_3 | 0.4 |
| Fe_2O_3 and FeO | 3.8 |
| MgO | 3.3 |
| CaO | 0.02 |
| TiO_2 | 31.4 |
| P_2O_5 | 0.7 |

The total amt. of residue was 0.52% of original sample and by calculation it is possible to obtain the per cent of original not obtained by rock analysis. The complexity of the residue analysis raises a question of recovery and value by work involved to obtain results. S. S. C.

Recommended specification for ceramic whitening. Bur. of Stand., *Circ.* **152**.—This circular deals with lime used in making glazes, enamels and similar ceramic products. Ceramic whitening is really calcium carbonate, with or without a small amt. of magnesium carbonate, but it performs the function of lime. It should contain not less than 97% of carbonates, and should be very fine, so that 98% of it will pass a No. 200 screen. H. F. S.

Plasticity and elasticity. EUGENE C. BINGHAM. *J. Franklin Inst.*, **197**, 99(1924).—Plasticity and elasticity are closely related. The stress time curve for lead wire is given showing elastic deformation and recovery, pseudo-plastic deformation and recovery, and plastic deformation. Stress-strain diagrams are misleading beyond the elastic limit if the time factor is lost sight of. Stress-strain diagrams of iron, rubber, steel, zinc, copper and tin are explained. Glass is referred to. Instantaneous rigidity is the resistance to distortion extrapolated to zero time. There are objections to the use of the term resilience beyond the elastic limit, because the time element must be considered. Elastic after-effect is a kind of plastic flow. R. J. M.

The use of filter plates of sintered glass in the chemical laboratory. G. F. HÜTTIG. *Oesterr. Chem.-Ztg.*, **27**, 13; *Z. angew. Chem.*, **37**, 48–50(1924).—The glass-works of Schott and Gen. of Jena will furnish filter plates and filtering crucibles of varying porosity which are made from powd. glass. They can be used in qual. and quant. analysis, in making chem. prepsns. and for the expts. of phys. chemistry. W. T. H. (C. A.)

A new combined viscometer and plastometer. E. C. BINGHAM AND H. A. MURRAY, JR., *et al.* *Proc. Am. Soc. Testing Materials*, **23**, II, 655–68(1923).—The times required for liquids or soft solids to fill successive portions of a calibrated capillary are measured on a chronograph. As the shearing stress varies along the capillary, the necessary data for a plasticity detn. or for duplicating fluidity detns. are obtained in less time than is often required for single fluidity detn. The method proves reliable when applied to castor oil over a range of temps. Preliminary measurements on a plastic paint give a lower yield value than was obtained with the Bingham and Green plastometer, but as the flow-shearing stress curve is linear it is suggested that there may be more than one régime of plastic flow. The paper is criticized at length by Green. E. C. B. (C. A.)

The thermal conductivity and specific heat of coal. F. S. SINNATT AND H. MACPHERSON. *Fuel*, **3**, 12–4(1923).—Because of the wide difference in results published in the past on the thermal condy. and sp. heat of coal, a systematic investigation of the banded ingredients was begun for the first time. The method for detg. the thermal condy. was that of Lodge (*Phil. Mag.*, **5**, 110(1878)) and Lees (*Phil. Trans.*, **184A** (1892)), the principle of which is described by Preston (*Theory of Heat*, 3rd. Ed. 1919). The sp. heat was detd. by Regnault's method of mixts., for which AmOH was most suitable. Values for 3 seams indicated that clarain has a condy. enough lower than durain (av. 0.00042 and 0.00052, resp., in C. G. S. units) to have a distinct effect on the rates at which the ingredients lose or gain heat and consequently to cause unequal stresses with change in temp. which may lead to fracture. Variations in the condy. of different types of coal were roughly proportional to the % ash, the following data giving the % ash and condy. $\times 10^4$, resp.: cannel 24.4, 69; Notts cannel 31.0, 62; shale cannel 33.3, 100; Smith shale 75.3, 110; Scotch oil shale 78.2, 130. In bituminous coals the condy. varied with the H_2O , the following data showing the % ash, % H_2O and condy. $\times 10^4$, resp., for clarain: Barnsley thick 1.0, 9.9, 37; Arley 0.8, 1.5, 43; Trencherbone 2.3, 4.1, 45. The av. sp. heat of durain, clarain and vitrain was 0.248, 0.246 and 0.252, resp., and of cannel, shale cannel, Notts cannel, Smith shale and Scotch shale 0.242, 0.226, 0.261, 0.210 and 0.217, resp. The results of the sp. heat show close agreement with those of Cole (C. A., **18**, 577). The work is reported in an incomplete form, owing to its having been suspended. C. C. D. (C. A.)

Researches on the relation between the surface, mass and volume of certain crystals. K. HRYNAKOWSKI. *I^{sz} Zjazd Chemików Polskich*, 1923, 14-5; cf. *ibid.*, 14.—It is shown that before the expression $dk/d\sigma \cdot \sigma + K = F[\sigma \cdot M_K - f(M_K/d)]$ can be applied to any crystal, it is necessary to obtain the value, P_r , of the function $f(M_K/d) \cdot P$; which is the surface of the given crystal. P_r must have a minimum value that of a sphere of the same vol., P_K , and the ratio P_r/P_K approaches more closely to unity as the symmetry of the crystal increases. For a no. of cryst. substances this ratio ranges from 1.579 for Cu sulfate to 1.307 for sucrose. J. C. S. (C. A.)

Some consequences of van der Waals' equation. M. TZENTNERSHVER. *Z. physik. Chem.*, 107, 81-96(1923).—For 0° the van der Waals' equation is $[p + (a/v^2)](v-b) = 1$. On putting $p = 0$, $(a/v^2)(v-b) = 1$ the roots of which are $v_1 = \infty$, $v_2 = (a/2) + \sqrt{(a^2/4) - ab}$ and $v_3 = (a/2) - \sqrt{(a^2/4) - ab}$. The last two roots are real if $a > 4b$. By substitution for a and b in this inequality of their values in terms of the crit. temp. and pressure the roots are real if the crit. temp. lies over the "limiting temp." 50.56° . When p is plotted against v for the van der Waals' equation, and as v increases from 0 there are first very large negative values of p rising to a max. while still negative then falling to $-\alpha$. On further increase of V , p jumps to $+\alpha$ and falls rapidly to a min., then rises to a max. and finally falls off asymptotically toward the axis $p = 0$. For gases with a crit. temp. under 50.56° the above min. of v falls at a positive value of p . For a gas whose crit. temp. is 50.56° the min. lies at $p = 0$ when $v = 2b$. For gases with a crit. temp. above 50.56° the min. lies in the region of negative pressure so that the curve crosses the axis $p = 0$ in 2 points. For example, with SO_2 which has a crit. temp. of 157.26° and $b = 0.002486$, the three values of v at which $p = 0$ are α , 0.003329 and 0.009831. For the general case of gases at any temp. the limiting temp., T_0 , can be computed in the same way and is found to be $T_0 = 0.843T_k$, where T_k is the crit. temp. It is shown further that a *limiting density* and a *limiting mol. vol.* can be derived.

F. L. B. (C. A.)

Surface films as plastic solids. R. E. WILSON AND E. D. RIES. *Colloid Symposium Monograph* (Univ. of Wisconsin), 1923, 145-73.—Bubbles from some colloidal solns. show marked stability because the surface films are plastic solids rather than viscous liquids. Other solns. having low surface tension fail to give stable bubbles because they give only fluid films. The plastic solid films are of colloidal, rather than mol. dimensions, and may take hours to attain max. strength; solns. forming such films give erroneously high surface-tension results by the du Noüy and presumably other methods, the yield value of the plastic solid film being added to the true reversible surface tension. In liquid-liquid interfaces in emulsifying agents the production of such films seems to require much higher concns. than in surface films. Plastic solid films of this type are important factors in *lubrication*, being the determining factor in the oiliness of a lubricant, which reduces friction at low speeds and high loads. Discussion follows. J. A. (C. A.)

Forces regulating the size of colloidal particles. E. F. BURTON. *Colloid Symposium Monograph* (Univ. of Wisconsin), 1923, 174-86.—The following aspects are considered: (1) slow rate of fall of small particles; (2) crystal forces at work in forming the nucleus of small particles; (3) role of surface tension in causing agglomeration of small particles; (4) mutual action of colloidal particles due to possession of electrical charges. Under (1) the following (see table) rate of fall is figured out on the basis of Stoke's law for silver particles falling in water (density assumed = 10.5, radius in table = r).

Surface tension contemplates surface with millions of mols., but there may be a lower limit to the size of surfaces to which surface-tension laws apply. Impurities and reaction affect particle growth; thus in alk. soln. NaCl tends to form octahedra, in acid soln. cubes. Expt. points to the existence of very formidable surface-tension forces

| r | Velocity, cm. per sec. | Time to fall 1 cm. |
|----------|------------------------|---|
| 1 cm. | 200,000 | 0.000005 sec. |
| 0.1 | 2,000 | 0.0005 |
| 0.01 | 20 | 0.05 |
| 0.001 | 2 | 5 |
| 0.0001 | 0.002 | 500 |
| 0.00001 | 0.00002 | 50,000 sec. = $1\frac{1}{2}$ day, approx. |
| 0.000001 | 0.0000002 | 5,000,000 sec. = 58 days, approx. |

acting on small particles. It seems safe to assume that the conglomeration of sub-microscopic crystals is regulated chiefly by the fundamental surface-tension law, viz., ($T \times A$) tends to a minimum. Optical expts. indicate that colloidal particles are usually spherical. In general, cessation of growth seems to be due to elec. charges, which limit the concn. of suspensoid solns., and increase *Brownian motion*. Discussion follows.

J. A. (C. A.)

The thirty-two classes of crystal symmetry. J. W. EVANS. *Nature*, **113**, 80 (1924).—A table is published which shows a logical and convenient compilation of data regarding the 32 symmetry classes of crystals.

S. K. A. (C. A.)

The importance of microanalysis for chemical analysis. L. MOSER. *Microchemie*, **1**, 1-4(1923).—Early in the 19th century the famous chemists were all analytical chemists but later it became the vogue to belittle analytical chemistry and carry out chiefly synthetic researches. Recently, analytical chemistry has been developing along new lines justifying renewed interest in research, and microanalysis represents one of these lines.

W. T. H. (C. A.)

A new addition to the Soxhlet extraction apparatus. P. H. PRAUSNITZ. *Z. angew. Chem.*, **37**, 50-1(1924).—Filter plates of fused Jena glass may be substituted for the usual paper filter thimbles in the Soxhlet extrn. app. These tubes are easily cleaned, and may be fused to the rest of the app.

T. S. C. (C. A.)

The behavior and properties of magnesium oxide of different origins. M. LÉBLANC AND K. RICHTER. *Z. physik. Chem.*, **107**, 357-402(1923).—An exceedingly detailed study is made upon 13 samples of MgO prepd. in various ways, as to purity microscopic and cryst. form, d., drying vol., ordinary and under pressure, amt. of dye adsorption, velocity and completeness of hydration, and the velocity of soln. in weak acids, etc.

G. L. C. (C. A.)

BOOKS

Science Remaking the World. Edited by Otis W. Caldwell and E. E. Slosson. New York: Doubleday, Page & Co. 288 pp. \$2.50. Reviewed in *Ind. Eng. Chem.*, **16**, 211(1924).

(C. A.)

SVEDBERG, THE: Colloid Chemistry. Wisconsin Lectures. New York: Chemical Catalog Co., Inc. 230 pp. \$3.00.

(C. A.)

GREGORY, RICHARD: Discovery or The Spirit and Service of Science. American edition. New York: The MacMillan Co. 347 pp. \$2.

(C. A.)

HAMMOND, D. B.: Stories of Scientific Discovery. Cambridge University Press. 199 pp. \$2.40. Reviewed in *Ind. Eng. Chem.*, **16**, 324(1924).

(C. A.)

General

China clay and petroleum. ANON. *Chem. Age*, **10**[248], p. 9(1924).—China clay is used to bleach mineral oils replacing bone black. The clay is used as a powder and agitated with oil, being allowed to settle out leaves a clear liquor behind. The clay is dried from 300-400°C. The theory as to the quantity of clay necessary is discussed and the relation of the intensity of the color of the liquid to the absorption by the clay.

The clay should be added methodically to remove each gradation of color and the clay changed after each removal. S. S. C.

Settling of clay suspensions. A. E. SEARLE. *Chem. Age*, 10 [248,] 16-27(1924).—Suspension is dependent on size, shape, specific gravity, temperature of the water and nature of the electrical charge on the particles. Churning with air causes a suspension to settle due to a positive charge on the air bubbles. The use of an electric current is possible to clarify the liquid of the clay particles and still the same size of particle is retained, which is not true when a pptn. is added. S. S. C.

Microscopical examination of china clay. J. M. COON. *Oil & Colour Trade Jour.*, 65, 457(1924).—China clay enters into such manuf. as paper filling, etc., it is therefore important to have it free from impurities; while chem. and mechanical analyses have their good purposes, a microscopical examn. is extremely valuable as a guide. Elutriation grades the sizes of particles to some extent, but it will not differentiate between the actual mineral constituents. C. prefers to exam. samples microscopically in a castor oil medium although water and Canada balsam may be used. A few milligrams of the sample are put on to a slide, and a drop or so of water added and carefully mixed. If oil is used as the medium, the slide must be dried, and an examn. made first with 1 in. objection, followed by $\frac{1}{4}$ in., and then $\frac{1}{8}$ in. The various minerals are then looked for, regarding all such as impurities. The paper is further illustrated with figures of the likely mineral constituents (*J. Roy. Mic. Soc.*). O. P. R. O.

Clay products situation throughout Canada. HOWELLS FRECHETTE. *Contract Rec. & Eng. Rev.*, 38, 183(1924).—A review of mfg. and market conditions in the chief clay working centers of the Dominion based on personal visits paid in a recent survey by F., Chief, Ceramic Division, Mines Branch, Department of Mines, Ottawa. He also deals with some of the troubles which brickmakers experience particularly the fuel problem. Natural gas, a very cheap fuel, has been a wonderful asset to the clay working industries of Medicine Hat and Redcliff, which could not otherwise operate at all. The action of the Saskatchewan Government in establishing a ceramic laboratory and providing a consulting ceramic engineer has been a great assistance to the clay manufacturers of the province. O. P. R. O.

Electrical precipitation of solids in stack gases. SCHROEDER. *Feuerungstechnik*, 12 [9], 65(1924).—Groups fuel losses through the stack under three headings (1) Radiation and conduction, (2) escape of gases of imperfect combustion such as CO, (3) direct loss of fuel in form of soot, coke and ash particles. Tests on different types of boilers showed the loss under (3) to run from 10.6% to 29.7%. F. A. W.

Kaolin as a filler in paper making. ANON. *Indus. Australian and Min. Stand.*, 71, 4(1924).—If china clay contains more than 2% of sand it is not suitable for use in paper making; in case of coated papers, the proportion of sand must not be greater than 0.1%; in fine grades of paper sand must not be more than 0.25%; in printing-paper the sand in the clay must not exceed 0.5%. Kaolin, added in moderate amount, makes paper more supple and facilitates its finishing; makes it more opaque and better suited for printing purposes; but clay added in too large proportions renders the paper soft and only slightly resistant to folding or crushing. Rigid rules for filling materials cannot be established, owing to the complication of factors that affect their application and which have a great influence on the proportion of the filling materials that remain in the manufactured paper. O. P. R. O.

Asbestos in the Union of South Africa. A. T. JUDGE. *Chem. Met. and Min. Soc. of S. A.*, 24, 84(1923).—Four different varieties of asbestos are mined in the Union: The serpentine form of asbestos, known as *chrysotile* (a hydrated magnesium silicate, characterized by its high magnesium and water content); the amphibole varieties, *crocidolite* (a silicate of iron and sodium); *amosite* (a silicate of iron with little or no

sodium); *tremolite* and *asbestic* (which are silicates of calcium and magnesium). This article is well illus.

O. P. R. O.

PATENT

Process of manufacturing antifriction bearings and compounds. CARL SCHMIDT. U. S. 1,482,414, Feb. 5, 1924. Process of manufacturing an antifriction bearing composition of a magnesia cement, consisting in mixing magnesiumoxyde (magnesia usta) with wood pulp previously soaked with oil, and chlormagnesialye, the resulting paste being dried to a cement of great sliding ability.

BOOK REVIEW

The Art of the Chinese Potter. R. L. HOBSON AND A. L. HETHERINGTON. New York. Alfred Knopf, 1924. \$50.00. One edition limited to 500 copies for the United States. There will be no reprint in any shape or form.

This volume of 192 examples of pottery dates from the Han Dynasty to the end of the Ming. The 53 colored plates and 100 half-tone plates are selected, described and with an introduction by R. L. Hobson, Keeper of the Department of Ceramics and Ethnography, British Museum, author of "Chinese Pottery and Porcelains," etc., and A. L. Hetherington, author of "The Early Ceramic Wares of China," etc. The introduction gives a short account of the general development of the potter's art in China from about 200 B.C. to 1644 A.D., including certain observations based on knowledge recently acquired. The color plates are so good that the collector may compare his specimens with them and note important or minute differences. Each plate has opposite it a detailed description of the body, glaze, decorator, its height, its historical placing, and its owner. Such reproductions as these are the next best thing to living within easy reach of the few museums which have large collections of the originals. The study of ceramics is greatly vitalized in this way for those living at a distance. This book with the text of Mr. Hobson's "Chinese Pottery and Porcelain," are of inestimable value to the collector, the teacher, and the student. Mr. Hobson invites fine artistic judgment with a thorough historical knowledge. The binding is of striped dull blue and dull orange colored paper, with white velum back and corners and gold lettering. The volume measures 8 by 11 $\frac{1}{2}$ inches.

MARY G. SHEERER.

CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

Art

A study of colored glass from Saint Remi church at Reims. G. CHESNEAU. *Comptes Rendus.*, **178** [10], 852-54(1924).—An article interesting for the history of the technique during the middle ages. The glass from St. Remi is compared with glass of the same color from the Cathedral at Reims which was so much destroyed during the war. The St. Remi glass is a century older than the Cathedral glass. The anal. follows:

| | Blue glass | | Red glass | |
|--------------------------------|------------|-----------|-----------|-----------|
| | St. Remi | Cathedral | St. Remi | Cathedral |
| SiO ₂ | 50.10 | 53.90 | 54.10 | 53.50 |
| TiO ₂ | Trace | 0.20 | 0.10 | Trace |
| SO ₃ | Trace | 0.20 | 0.10 | Trace |
| Ig. Loss | 0.30 | 0.40 | 0.50 | 0.40 |
| Al ₂ O ₃ | 4.30 | 3.90 | 3.30 | 3.00 |
| CaO | 18.60 | 19.30 | 16.60 | 17.80 |
| MgO | 4.70 | 4.10 | 4.70 | 6.10 |
| K ₂ O | 16.70 | 12.20 | 15.10 | 15.00 |
| Na ₂ O | 2.60 | 1.90 | 1.90 | 1.80 |
| PbO | 0.10 | Trace | 0.10 | 0.03 |
| B ₂ O ₃ | 0.08 | 0.02 | 0.10 | 0.03 |
| Coloring Agents | | | | |
| CuO | 0.08 | 0.13 | 0.20 | 0.13 |
| CoO | 1.03 | 0.25 | 0.20 | 0.13 |
| Mn ₃ O ₄ | 0.63 | 3.03 | 1.22 | 0.86 |
| Fe ₂ O ₃ | 0.95 | 0.79 | 1.90 | 0.84 |
| Total | 100.17 | 100.32 | 99.72 | 99.46 |

Excepting the coloring agents, the compns. are very close. It is safe to say the raw materials for the two batches were the same. The workshops which made the glass, a century apart, had the same origin. The blue glass from the Cathedral has a violet tint, while the St. Remi blue is noted for its purity of shade. The CoO is 4 times as abundant in the St. Remi as in the Cathedral, while inversely the Mn₃O₄ is 5 times as abundant in the Cathedral as in St. Remi. The red glass studied in section shows a marked difference in the method of manuf. The glassmakers of the middle ages made the red glass by gathering white glass and covering it with a coating of enamel made from Cu. The Cathedral shows only one coating of red enamel on white glass. The St. Remi shows 5 layers of red enamel which are thinner and of a clearer shade and show numerous defects produced during the drawing of the mass and seems to denote an enamel more fluid than that used in the Cathedral. The Cathedral glass is a deeper red and the enamel is much more uniform.

W. R. K.

Colored Ceramics of Assur. J. GR. *Keram. Rund.*, **32**, 161-2(1924).—Ancient ceram. art is described from Assur as was revealed by specimens excavated from this locality.

H. G. S.

Shape of clay wares and their etymology. SHINZO OSUKA. *J. Jap. Cer. Assoc.*, **32** [373], 21-26(1924).—The author has long investigated on the etymology of Jap. and Chin. words for ceramic wares. Some of the results are given with many illustrations.

S. K.

Experiment on raw lead glaze. TAKEO OSHIDA. *Tokio Indus. Lab. Bul.*, **18** [3], 33-48(1923).—1. *Exptl. formula of the glaze.*—61 formulae of raw lead glaze found in lit. have been tried in the expt., using white lead as the source of lead. 2. *Procedure of expt.*—Each batch of about 300 g. was mixed with 700 cc. of water and ground for

5 hrs. The glaze was applied on cups of feldspathic faience which was composed of 25 washed Kibushi (plastic shale), 25 Shiraetsuchi (kaolin), 15 feldspar and 35 quartzite grog, biscuited at cone 6a and partly painted with cobalt blue, chrome green and chrome pink. The cups were then glost-fired at cones 010a, 05a, 1a and 6a. 3. *Results*.—Results are shown in a table. Picking out those glazes which matured bright at two temps. and have not crazed within 2 years, we have

| Cone No. | Average of | Average chemical formula | | | | | |
|--------------|------------|--------------------------|------------------|------|------|--------------------------------|------------------|
| | | PbO | K ₂ O | CaO | ZnO | Al ₂ O ₃ | SiO ₂ |
| 010a and 05a | 3 glazes | 1.00 | .. | .. | .. | 0.09 | 1.32 |
| 05a and 1a | 3 glazes | 1.00 | .. | .. | .. | 0.17 | 1.28 |
| | 1 glaze | 0.70 | .. | 0.30 | .. | 0.10 | 1.30 |
| | 3 glazes | 0.90 | 0.03 | 0.70 | .. | 0.13 | 1.27 |
| | 5 glazes | 0.80 | 0.02 | 0.14 | 0.04 | 0.14 | 1.26 |
| | 18 glazes | 0.70 | 0.06 | 0.19 | 0.05 | 0.19 | 1.49 |
| 1a and 6a | 9 glazes | 0.60 | 0.12 | 0.17 | 0.11 | 0.23 | 1.73 |
| | 4 glazes | 0.50 | 0.20 | 0.10 | 0.20 | 0.30 | 2.10 |
| | 1 glaze | 0.40 | 0.20 | 0.10 | 0.30 | 0.30 | 2.10 |

Generally speaking, raw lead glaze seriously affects the underglaze color and has a disagreeable yellowish tint due to high content of lead; it is liable to produce flaws and is too fluid.

S. K.

Preparation of substitutes for Chinese blue called "Gosu." KO ISHII. *Rept. Pottery Lab.* (Kioto), [2], 1-28(1923).—1. *Introduction*.—At present, the Chinese cobalt ore called "Gosu" which has long been the most important underglaze color in the Orient is scarce and, moreover, it requires tedious treatments for refining. A few years ago, H. Ueda, head of the lab., studied on its substitutes and patented a process in which coloring metals are pptd. as cyanogen compds. (Jap. Pat. No. 31,722). The paper relates to the systematic study on the patent. 2. *Body and glaze*.—A porcelain body composed of Amakusa (semi-decomposed liparite) 65, feldspar 15 and Gairome (plastic kaolin) 20, and a glaze 0.178 K₂O, 0.065 Na₂O, 0.748 CaO, 0.009 MgO, 0.483 Al₂O₃, 4.73 SiO₂ were used. 3. *Chem. reaction and process of prepg. the artificial color*.—(a) Co₂Fe(CN)₆, Mn₂Fe(CN)₆ and Ni₂Fe(CN)₆ were pptd. from solns. of CoCl₂.6aq, MnSO₄.7aq and NiSO₄.7aq resp. with K₄Fe(CN)₆.3aq. (b) K₃Fe(CN)₆ was used instead of K₄Fe(CN)₆.3aq. The ppts. were washed, dried, ground, and proportioned. The mixt. was then ignited to remove its plasticity. 4. *Comparison of cobalt ferrocyanide and ferricyanide*.—A color consisting of 51.68 Korean kaolin and 48.32 cobalt ferrocyanide proved to be a little superior to that consisting of 46.06 Korean kaolin and 53.94 cobalt ferricyanide. 5. *Mixt. of ferrocyanides of Co and Mn or Ni*.—Ni produces a shade of bluish black or blackish grey. Its action is more violent than that of Mn. Nice purplish indigo was developed with compds. of 44.46-50.05 Korean kaolin, 41.58-46.80 Co ferrocyanide and 13.96-3.15 Mn ferrocyanide, when fired at cone 11 with reducing flame. 6. *Mixts. of Co, Mn and Ni ferrocyanides*.—Among 21 batches tried, the following gave the best results:

| Batch | Korean kaolin | Co ₂ Fe(CN) ₆ | Mn ₂ Fe(CN) ₆ | Ni ₂ Fe(CN) ₆ | Color produced |
|------------------|---------------|-------------------------------------|-------------------------------------|-------------------------------------|---|
| MN ₁₆ | 49.62 | 46.41 | 0.75 | 3.19 | Bright purplish indigo |
| MN ₁₇ | 50.43 | 47.15 | 0.80 | 1.62 | |
| MN ₄ | 43.22 | 40.42 | 13.58 | 2.78 | Nice indigo-blue, very close to that of native "Gosu" |
| MN ₆ | 44.14 | 41.28 | 13.87 | 0.71 | |
| MN ₇ | 46.37 | 43.35 | 7.28 | 2.98 | |
| MN ₃ | 38.76 | 36.25 | 24.37 | 0.62 | Dull blackish blue |

7. *Further correction of color.*—Varying amts. of $\text{Zn}_2\text{Fe}(\text{CN})_6$, ZnO , FeCrO_4 or $\text{Zn}(\text{OH})_6\text{CrO}_4$ were added to the artificial "Gosu" MN_7 to remove its purplish shade. Mixt. of 93.42% MN_7 and 6.58% $\text{Zn}(\text{OH})_6\text{CrO}_4$ gave a nice result. The latter compd. is obtained by boiling mixed solns. of $\text{Zn}(\text{NO}_3)_2$ and $\text{K}_2\text{Cr}_2\text{O}_7$. S. K.

Experiment on the Tenriuji-Celadon glaze. Ko ISHII. *Report Pottery Lab.* (Kioto), [2], 55-73(1923).—1. *Introduction.*—Tenriuji is a kind of Celadon having a shade of deep green or slightly yellowish green. The glaze must be transparent, bright and free from crazing. 2. *Basal glaze and body.*—It is known that iron glazes rich in potash and poor in lime favor the production of Kinuta-Celadon which has indigo shades while those rich in lime tend to produce Tenriuji-Celadon which has green shades.

Therefore, 9 glazes within the range of $\left. \begin{matrix} 0.2\text{K}_2\text{O} \\ 0.8\text{CaO} \end{matrix} \right\} 0.3\text{--}0.5 \text{ Al}_2\text{O}_3 \cdot 3.0\text{--}4.0 \text{ SiO}_2$ have been

tried, adding 3.5 ferrous silicate and 0.05 chromium oxide to 100.0 batch of each basal glaze; ferrous silicate was prepd. by htg. a mixt. of 1 mol. FeO and 3 mol. SiO_2 to cone 11 with reducing flame. Body was composed of 60 Amakusa, 15 feldspar, 25 Gairome and 2 ferric oxide. 3. *Glazing and firing.*—Wares were dipped in or poured with pretty thick glaze, dried thoroughly and, then coated with thicker glaze slip containing Funori glue by means of a brush. The latter treatments were repeated 2 or 3 times more. Glaze must be crushed to pass through a $1/16$ " mesh sieve and then ground 20 hrs. in a pot mill. After glazing, the wares were fired at cone 9-10 with reducing flame of wood.

The best result was obtained with basal glaze VI which corresponds to $\left. \begin{matrix} 0.2\text{K}_2\text{O} \\ 0.8\text{CaO} \end{matrix} \right\} 0.4\text{--}$

$\text{Al}_2\text{O}_3 \cdot 4.0\text{SiO}_2$ and was composed of 21.0 limestone, 14.6 feldspar, 58.0 Amakusa and 6.4 silica. The color was bright light green. 4. *Effect of chromium oxide as auxiliary colorant.*—Chrome green is not affected by the nature of flame. Therefore, chrome Celadon is widely made by adding chromium oxide in its glaze or body, though it appears mean and is deficient of brightness on account of its turbidity. However, its slight addn. as described in 2 is desirable, because it makes the Celadon deep green. Expt. has proved that 0.05 chromium oxide to 100.0 basal glaze is the best proportion. 5. *Effect of rutile as auxiliary colorant.*—Addition of 0.20-0.30 rutile to 100.0 glaze VI and 3.5 ferrous silicate produced nice green, while 0.40-0.50 rutile gave good yellowish green. 6. *Effect of manganese carbonate as auxiliary colorant.*—Celadon glazes contg. manganese carbonate are deeply affected by the nature of flame. However, those composed of about 4.5 manganese carbonate, 3.5 ferrous silicate and 100.0 glaze VI gave excellent green Celadon when fired in perfectly reducing atmosphere. S. K.

Manufacture of calcareous faience from Terayama white clay and Iwaki shale. JIROKICHI KUMAZAWA AND TAKEHIKO UKISU. *The Tokio Industrial Lab., Bull.* 18 [3], 1-32(1923).—Terayama white clay is a fine siliceous clay produced at Terayama Izumimura, Enyagun in Tochigi Prefecture as decompn.-product of liparite. Its anal. is: Loss on ig. 5.66, silica 79.25, alumina 14.16, ferric oxide 0.59, lime 0.19, magnesia 0.08, potash 0.04 and soda 0.36%. It burns white and melts at cone 2830. On the other hand, Iwaki shale, chiefly produced in Akai district of Iwakigun, is a fire clay with refractoriness of cone 31-34. Wares made of 30 different compds. consisting of 15-35 Iwaki shale, 5-30 limestone and 80-35 Terayama white clay were biscuited at cones 3a, 5a and 6a and then glost-fired at cone 05a after applying a glaze as $\left. \begin{matrix} 0.25\text{Na}_2\text{O} \\ 0.10\text{K}_2\text{O} \\ 0.10\text{CaO} \\ 0.55\text{PbO} \end{matrix} \right\} 0.30\text{Al}_2\text{O}_3 \left\{ \begin{matrix} 3.0\text{SiO}_2 \\ 0.5\text{B}_2\text{O}_3 \end{matrix} \right.$ Results, in short, are: (1) The white clay favors

shivering, no compd. being safe for 3 biscuit temps., though several were free from shivering at each temp.; (2) Iwaki shale cannot be used for pure white ware. The

authors exptd., at the same time, on 24 different compds. consisting of 20-35 Tokiguchi Gairome (plastic kaolin), 5-30 limestone and 75-35 Terayama white clay in the similar way with the result that those with the propns. as 25:15:60, 30:10:60, 30:15:55, 30:20:50 and 35:15:50 give excellent results for any of the 3 biscuit temps. S. K.

Experiment on the manufacture of leadless overglaze colors. JIKEI UEDA. *Rept. Pottery Lab.* (Kioto), [2], 29-54(1923).—1. *Introduction.*—The paper relates to the elimination of lead with bismuth. 2. *Manuf. of leadless fluxes.*—(a) Flux composed of bismuth oxide and silica. Essential constituents of lead fluxes are lead oxide and silica. But similar fluxes as $\text{Bi}_2\text{O}_3 \cdot (1-3)\text{SiO}_2$ are too hard. (b) Flux composed of bismuth oxide, alkali and silica. Flux $\left. \begin{matrix} \text{Na}_2\text{O} \\ \text{Bi}_2\text{O}_3 \end{matrix} \right\} 5\text{SiO}_2$ is still too hard and, moreover, is useless for ferric oxide red as its high content of alkali badly affects the color. (c) Fluxes composed of bismuth oxide, boric acid, alkali and silica. Flux $\left. \begin{matrix} \text{K}_2\text{O} \\ \text{Bi}_2\text{O}_3 \end{matrix} \right\} \begin{matrix} 3\text{B}_2\text{O}_3 \\ 2\text{SiO}_2 \end{matrix}$ is pretty good for blue, green and black colors, although it is too sol. in water. Flux $\left. \begin{matrix} \text{K}_2\text{O} \\ 2\text{Bi}_2\text{O}_3 \end{matrix} \right\} \begin{matrix} 6\text{B}_2\text{O}_3 \\ 4\text{SiO}_2 \end{matrix}$ is better, as it is less sol. (d) Fluxes composed of bismuth oxide and boric acid. The author has got best results with these fluxes. Flux I $\text{Bi}_2\text{O}_3 \cdot 3\text{B}_2\text{O}_3$ is suitable for blue, green and yellow colors. Flux II. $\text{Bi}_2\text{O}_3 \cdot 4\text{B}_2\text{O}_3$ is suitable for red and black colors which require high propn. of colorants. Both fluxes were prepd. by melting batches composed of boric acid and bismuth oxide or subnitrate in biscuited crucible of chem. porcelain which had an aperture in its bottom. 3. *Manuf. of leadless overglaze colors.*—(a) *Blue color.* A nice blue color was obtained when 100.0 Flux I was mixed with 10.0 blue stain which had been prepd. by htg. a batch consisting of 25 cobalt oxide, 50 aluminium hydroxide and 25 aluminium sulphate at cone 10 or higher. (b) *Green color.* A green of medium intensity was produced with a color consisting of 100.0 Flux I and 7.0 chromium oxide. (c) *Yellow color.* An orange yellow color was obtained when 10 am. uranate was mixed with 100 Flux I. A colorant obtained by igniting a batch as 16.0 stannic oxide, 32.0 antimony oxide, 52.0 bismuth oxide and 2.0 ferric oxide at about 700°C produced a very nice yellow when it was mixed with 10 times Flux I. (d) *Red color.* Best propn. of Flux II and ferric oxide is 80.0:20.0. Black shade in the red owes to the quality of the oxide. It is best corrected by adding 10 alumina to 100 ferric oxide. Excellent result was obtained when carbonates of Fe and Al were pptd. from a mixt. of acidified soln. of FeCl_3 and aq. soln. of $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ with sodium carbonate soln. It has to be thoroughly washed, dried and ignited at about 750°C in oxidizing atmosphere. On the other hand, mixed soln. of $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ and $\text{Al}(\text{NO}_3)_3 \cdot 8\text{H}_2\text{O}$ may be treated with ammonia. Latter process is much more simple. (e) *Black color.* The best result was obtained with a color consisting of 20.0 stain and 80.0 Flux II. The stain was prepd. by igniting a mixt. of 40.0 cobalt oxide, 20.0 ferric oxide, 20.0 manganese oxide and 20.0 chromium oxide at cone 10. S. K.

Gift of a collection of Japanese ceramics. ANON. *Bull. Met. Museum Art, Jan.*, 1924.—The Brinkley collection of Japanese Pottery given to the Museum in memory of Charles Stewart Smith has been one of the chief prides of the Museum. This has just been augmented by the gift of another collection from Mrs. V. Everit Macy. The second collection is equal to the first in merit and importance and is different enough in composition and detail to complete the series, and fill in the gaps. There is now no other collection that can rival it even in Japan. A. A. A.

A neo-Attic marble vase. ANON. *Bull. Met. Museum Art, Jan.*, 1924.—A recent and important acquisition in the Classical Department of the Museum is a large marble vase decorated with dancing women in low relief, a product of the art of the early Roman Empire. Large marble vases with ornamental reliefs must have been very popular

in Roman times for a great many have survived. Examples particularly close to ours are in the Museum of the capitol and in the Vatican. The three most famous are in the Louvre, the Capitoline Museum, and in Naples. Artistically our example ranks as one of the finest known and demonstrates the high level attained during the early Roman Empire in the decorative field. A. A. A.

Windows of old France. CHARLES J. CONNICK. *International Studio*, Jan., 1924.—The character and artistic influence of Abbot Suger seen in stained glass of Cathedrals of Saint Denis and Chartres. This article is continued in the Feb. number. A. A. A.

Old China from Chelsea. MRS. GORDON STABLES. *International Studio*, Feb., 1924.—This is an interesting story of the wealth of artistic figures produced in one factory in England in a few years, nearly 2 centuries ago. A. A. A.

Gifts from the Carnarvons. ANON. *Bull. Met. Museum of Art*, Dec., 1923.—Following Lord Carnarvon's tragic death it was found he had given to the Museum a very valuable latiform vase of opaque glass, of a delicate turquoise blue color, the rim mounted in gold and bearing on the side an inscription dating the vase to the reign of Thutmose III of the XVIIIth dynasty. It is one of the most important examples of Egyptian glass making and is the chief point of interest in the Museum collection of that period. The Countess of Carnarvon has given the superb alabaster (aragonite) vase 15½ inches in height, bearing the name of King Merneptah of the XIXth dynasty. One of 13 such vases found in 1920 in the Valley of the Kings, by Lord Carnarvon and Howard Carter. Another gift, through the generosity of V. Everit Macy is a very rare piece of Egypto-Syrian enameled glass, the known specimens of which precious objects number only 400 including fragments. In the Arabic Museum at Cairo there are 68 specimens and the next largest collection is owned by our Metropolitan Museum. This last acquisition is a magnificent specimen of the rarest type of Egypto-Syrian glass, a sweetmeat bowl in the form of a tall standing cup with intricate patterns delicately wrought in red, blue, green, yellow and white enamels and in gold. The glass is rather thick showing characteristic air bubbles—Early 14th Century. A. A. A.

Mosaics old and new. F. E. WASHBURN-FREUND. *International Studio*, April, 1924.—A story of the modern revival of the greatest art of the early Christian era. A. A. A.

Color measurements. L. A. JONES. *Am. Dyestuff Rept.*, 13, 121-31(1924).—About 2 pages of exts. are quoted from the report of the Colorimeter Committee, Optical Soc. Am. Many technical terms for the different attributes of color are defined from a modern point of view. Spectral energy, spectral photometric transmission and density, hue sensibility, and satn. sensibility are illustrated by graphs. The Nutting monochromatic analyzer and the Eastman universal colorimeter are illustrated and described. L. W. R. (C. A.)

Cement, Lime and Plaster

On the properties of cements for paving. KUICHI KOYAMA. *J. Jap. Cer. Assoc.*, 31 [372], 400-6(1924).—Jap. Specif. of Port. cement are criticized for its use in paving. Italian Soliditit cement, analyzing as silica 34.27, alumina 11.87, ferric oxide 5.00, lime 42.40, magnesia 0.68, potash 0.51, soda 2.99, sulphuric anhydride 1.38, sulphur 0.01 and loss on ig. 2.80%, was used in some exptl. road in Tokio and Osaka whose result is not yet reported. S. K.

Enamels

Studies growth of gray iron. T. E. HULL. *Foundry*, 52 [7], 253-4(1924).—The first growth of cast iron is due to occluded gases, which being liberated under press.,

cause deformation of the graphite crystals. This opens up avenues for the entrance of oxygen to the iron. The second stage of growth is due to oxidation of iron silicide. As the point of max. growth is approached, some free iron is oxidized. M. E. M.

Glass

Making Fourcault flat glass at the Fairchance factory. J. M. HAMMER. *The Glass Worker*, 43 [27], 9(1924).—The first Fourcault flat glass made east of the Mississippi is at the plant of the Quertinmont Glass Co., Fairchance, Pa. Four machines are in operation on glass from single strength to 42 oz. The distance from the tank to the cutting table is 18 ft. The glass is drawn through a clay guide and pulled upward by asbestos rollers to the cutting off floor. Sheets range from 72" to 78" long by 54" wide. Modern equipment is used throughout. R. J. M.

The glass container and public welfare. J. G. JENNINGS. *Glass Container*, 3 [6], 5-7(1924).—One of the arguments made before the Interstate Commerce Commission in the pending Food Packer's Classification Case showing conclusively why the rates on food products packed in glass should enjoy the same rates as the same products packed in tin and other containers. W. M. C.

The importance of the milk bottle as a factor in public health. ANON. *Glass Container*, 3 [6], 8, 26, 34(1924).—The glass bottle is a factor no less important than pasteurization in protecting the health of the populace. The great reduction in infant mortality and many other blessings of pure milk are thus in largest measure due to the sanitary milk bottle. The bottle, commonplace as it is in our daily life, and insignificant though it may seem to the casual, is a vital protecting agency. Gives a tabulated report of an investigation made with 60 of the larger cities in the U. S. to det. the percentage of milk sold in glass bottles. W. M. C.

Glass makes travel safe for those who go down to the sea in ships. ANON. *Glass Container*, 3 [6], 10, 11, 44(1924).—Striking development of powerful lights and light-houses in contrast to ancient fires on shore and essential part of glass in this evolution. W. M. C.

On the weathering of bulb glass. SANGORO TAKAHASHI. *J. Jap. Cer. Assoc.*, 32 [373], 1-5(1924).—In the first part, the results of expts., in which published methods of testing glass on chem. behavior of its surface had been followed, are given. 4 glasses with formulae of (1) $0.9\text{Na}_2\text{O} \cdot 0.1\text{PbO} \cdot 0.6\text{SiO}_2$, (2) $1.3\text{Na}_2\text{O} \cdot 0.7\text{CaO} \cdot 0.6\text{SiO}_2$, (3) $0.6\text{Na}_2\text{O} \cdot 2.0\text{B}_2\text{O}_3 \cdot 0.6\text{SiO}_2$ and (4) $0.8\text{Na}_2\text{O} \cdot 0.4\text{K}_2\text{O} \cdot 0.6\text{SiO}_2$ were used in the expts. The results were as follows:

| Glass loss which occurs when glass ground to pass through a No. 20 sieve is digested in water of an autoclave | | Bloom of glass beads when they are htd. in steam of an autoclave | | Alkali taken up by 150 cc. of water 92°C in 1 hr. per 5 g. of glass ground to pass through a No. 25 sieve, expressed in mg. of soda | | Devitrification caused by htg. glass for 3 hrs. in an elec. fur. (5-7 hrs. were required for cooling) | | | |
|---|------------------|--|------------------|---|-------|---|------------|------------|--|
| 4 atm. 2 hrs. | 6 atm. 3 hrs. | 4 atm. 2 hrs. | 6 atm. 3 hrs. | | 500°C | 600°C | 700°C | 800°C | |
| (1) 0.04% | 0.10% | None | Slight | 1.52 | None | Medial | Remarkable | Remarkable | |
| (2) 0.48% | 1.14% | Medial | Remarkable | 7.47 | None | None | Medial | Remarkable | |
| (3) 0.60% | 5.16% | None | None | 15.93 | None | None | None | Medial | |
| (4) 19.35% | 29.07% | None | None | 48.36 | None | None | None | Medial | |

Crystals due to weathering occur usually on inner surface of the bulb before sealing Glass (1) was most insusceptible to weathering, though its crystal was only removed

with dil. soln. of HF. Then the app. for testing glass on its resistance to weathering is described. It is a wooden box with a door which is heated elec. and has a producer of CO₂ or other gas and a water pan or a drying app. When glasses are put in moist air of the app., temps. 30–40°C are most favorable to their weathering. Introduction of CO₂ accelerates it. Glass (1) has been weathered in 3–7 days in the app., while it requires 2 months even in rainy season for its testing in ordinary atmosphere. Microphotographs are given. S. K.

Coloring action of bismuth on glass. KITSUZO FUWA. *J. Jap. Cer. Assoc.*, **32** [373], 5–18(1924); cf. *Ceram. Abs.*, **2** [11], 242–4(1923).—282 batches of various glasses were melted to find the influence of their chem. compn. on the coloring action of Bi compds., with or without addn. of oxidizing or reducing agent. Chem. formulae of the glasses were $R'_2O.R''0.3SiO_2$ and $R'_2O.R''0.0.5B_2O_3.3SiO_2$, where R' and R'' represent Na or K and Ca, Mg, Zn, Ba or Pb, resp. 1. *Basic carbonate of Bi*, $2(BiO)_2 \cdot CO_3 \cdot H_2O$.—2.5–5% of the carbonate imparts a color which varies from gray to brown to most glasses, while the others remain colorless. Generally speaking, the color is lightest in borosilicate glasses and darkest in boronless potash glasses. Reheating favors the brown coloration, sometimes opacifying the glass. These changes occur usually at surface in borosilicate glasses. The brown or gray coloration of Bi glasses may be attributed to the formation of colloidal Bi. 2. *Bi subnitrate*, $Bi(OH)_2NO_3$.—The coloration is generally weaker than in 1, but the difference disappears on reheating. 3. *Basic carbonate of Bi and K nitrate*.—Addition of an oxidizing agent as K nitrate reduces the coloration, the tendency being observed even after reheating. 4. *Basic carbonate of Bi and K tartarate*.—The reducing agent has little influence upon the action of the carbonate. 5. *Basic carbonate of Bi and arsenious acid*.—0.5–1.0% of arsenious acid added to the batches prevents the glasses from being colored by the Bi carbonate, though the reheating reduces its influence. S. K.

Color imparted to glass by stannic oxide. KITSUZO FUWA. *J. Jap. Cer. Assoc.*, **32** [373], 18–20(1924).—Amts. of stannic acid required for opacifying various glasses are given.

| Formula of glass | Stannic acid added. (%) | Appearance of glass | Appearance after reheating |
|------------------------------------|-------------------------|-----------------------|----------------------------|
| 1. $3Na_2O \cdot CaO \cdot 6SiO_2$ | 25.0 | Transparent | Transparent |
| 1. $3K_2O \cdot CaO \cdot 6SiO_2$ | 30.0 | Transparent | Transparent |
| 1. $3Na_2O \cdot MgO \cdot 6SiO_2$ | 20.0 | Light bluish and opal | Light bluish and opal |
| 1. $3Na_2O \cdot MgO \cdot 6SiO_2$ | 30.0 | Opal | Opal |
| 1. $3K_2O \cdot MgO \cdot 6SiO_2$ | 10.0 | Like Alabaster | Like Alabaster |
| 1. $3Na_2O \cdot ZnO \cdot 6SiO_2$ | 25.0 | Transparent | Transparent and iridescent |
| 1. $3K_2O \cdot ZnO \cdot 6SiO_2$ | 40.0 | Transparent | Transparent and iridescent |
| 1. $3Na_2O \cdot BaO \cdot 6SiO_2$ | 25.0 | Transparent | Transparent |
| 1. $3Na_2O \cdot BaO \cdot 6SiO_2$ | 30.0 | White and opaque | White and opaque |
| 1. $3K_2O \cdot BaO \cdot 6SiO_2$ | 30.0 | Transparent | Slightly iridescent |
| 1. $3Na_2O \cdot PbO \cdot 6SiO_2$ | 20.0 | Greenish and opaque | Gray in surface |
| 1. $3K_2O \cdot PbO \cdot 6SiO_2$ | 20.0 | Opaque | Opaque |

S. K.

On the waste gases of tank furnace. HIROO IWAI. The Asahi Glass Co., *Bull.* [9], 37 pp.(1923).—Elaborate expts. on the waste gases of the Siemens regenerative tank fur. at the Tsurumi plant of the Co., manufacturers of window glass, are described. Reversing of air and producer gas currents occurred every 20 min. Results: 1. *Temp. of the waste gases*.—The av. temp. at the outlets of air regenerators, the inlet of air valve,

its outlet, the middle of flue and the foot of stack were 466° , 432° , 330° , 316° and 301°C , resp. 2. *Compn. of the waste gases*.—Anal. of the hot gases, expressed in volume %, at the inlet and outlet of the air-reversing valve were:

| | CO ₂ | O ₂ | N ₂ | H ₂ O |
|---------------|-----------------|----------------|----------------|------------------|
| At the inlet | 9.9 | 3.0 | 71.9 | 15.1 |
| At the outlet | 7.9 | 6.2 | 74.0 | 12.0 |

3. *Amt. of the waste gases, leakage of air at the valve and calcn. of air excess*.—Amts. of the gases at the in- and outlets of the valve were 12.73 and 15.97 l. per kg. of coal, resp. The leakage of air at air valve was 25.4% in volume. Excess of air was 39.6%. 4. *Calcn. of the waste heat*.—Heat of the waste gases at the inlet of air valve corresponded to 39.5% of that generated by coal, taking the latent heat of aqueous vapor in calcn.

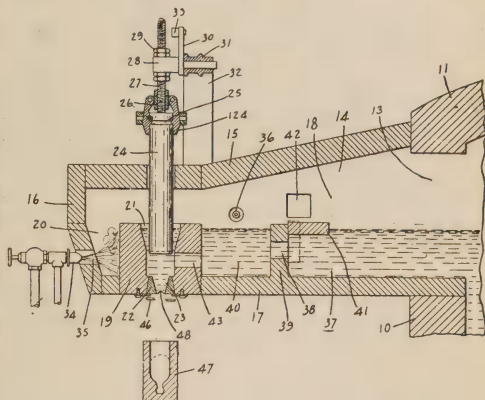
S. K.

Properties of pitch used in working optical glass. F. W. PRESTON. *Trans. Optical Soc.*, 24, 117-40(1923).

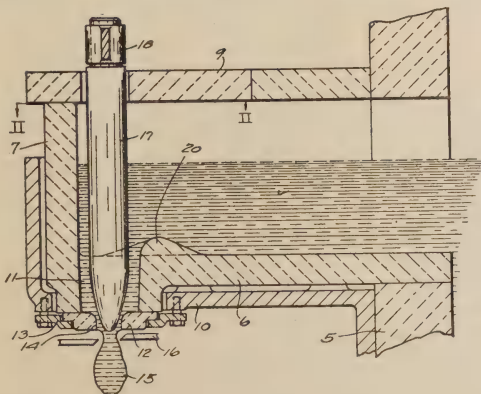
E. J. C. (C. A.)

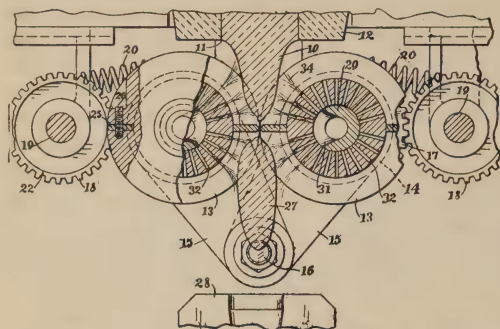
PATENTS

Glass-feed mechanism. JOHN RAU. U. S. 1,491,067, Apr. 22. The combination with a glass tank, of a glass discharge spout into which the molten glass is adapted to pass, said spout being provided with a receiving chamber, a feeding chamber sepd. therefrom by a partition having a feed opening there-through, a float valve for opening or closing said opening, a plunger chamber positioned adjacent said feeding chamber and communicating therewith through a plurality of passageways, one above the other, a plunger adapted to be reciprocated within said plunger chamber for forcing the glass through an orifice in the bottom thereof, and means for maintaining the glass contained in said plunger chamber at a high temperature, said means comprising a space between the ends of said spout and wall of said chamber, and a nozzle for engaging a flame therein for heating the glass contained in said plunger chamber to a high temp. substantially as described.



Glass feeder. RICHARD LA FRANCE. U. S. 1,490,930, Apr. 22. The combination of a fur., a fore-hearth of boot extending therefrom, said boot provided with a discharge opening through the bottom thereof, and a plunger projecting downward into said opening, said floor being provided with a hump or raised portion directly behind the plunger and beneath the normal level of the glass, the width of the hump being equal to or greater than the diameter of the discharge opening.





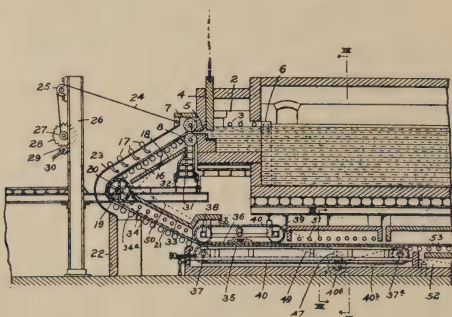
Means to produce charges of hot glass. LEONARD D. SOUBIER. U. S. 1,490,946, Apr. 22. The combination with means to flow a stream or column of molten glass, of a pair of forming rolls provided with recesses in their peripheries arranged to embrace the flowing glass, and means to supply burning gas to envelop the glass as it passes between the rolls.

Process and apparatus for making sheet glass. JOHN H. FOX.

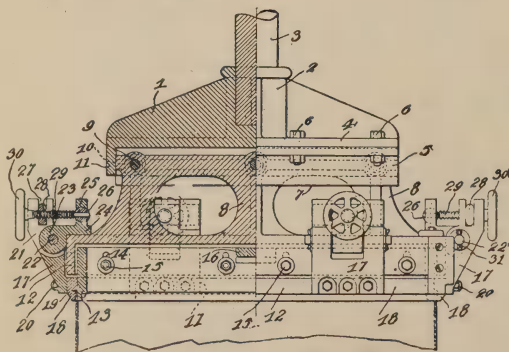
U. S. 1,492,975, May 6. The process of making sheet glass which consists in conducting molten glass laterally from a relatively large body rolling or sizing the sheet to uniform thickness, fire finishing the upper surface of the sheet as it moves forward, turning the sheet to bring the upper surface down and its other surface up and then fire finishing such other surface which is not up, all during the continuous forward movement of the sheet.

Machine for working on glass.

WALTER J. LEVERIDGE and PAUL SCHWERIN. U. S. 1,492,602, May 6. A machine for inserting wires into glass rods comprising a mold receptacle for the rods, means for heating the rods, lever mechanism for feeding the wires up to the rods, a second lever mechanism for slowly forcing the wires into the rods, cam mechanism for cutting off the wires a definite distance from the points of insertion and after insertion, and lever mechanism for ejecting the rods with the wires inserted into said receptacle.



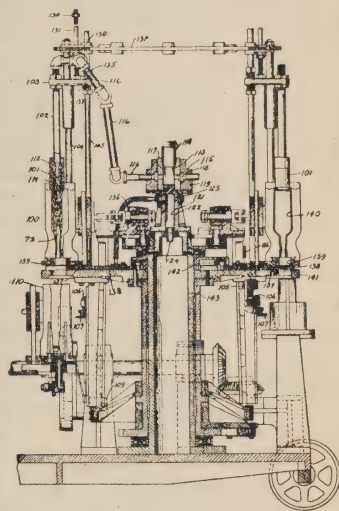
Glass-drawing machine. ARTHUR HOUSIERE and JULES HOUSIERE. U. S. 1,491,749, April 22. A glass drawing machine including a holder, a carriage movably suspended from said holder, stationary jaw members detachably connected to the carriage and mounted for adjustment thereon, movable jaw members supported by the carriage and adapted to be moved toward and away from the stationary jaw members, screw members loosely connected with the carriage and having engagement with the movable jaws whereby adjustment of said screw members will move the movable jaws toward and away from the stationary jaws.



Glass-manufacturing machinery. SAMUEL E. WINDER. U. S. 1,491,369, Apr. 22.

In a glass molding machine a rotatable table, a brake drum fixed to and concentric with

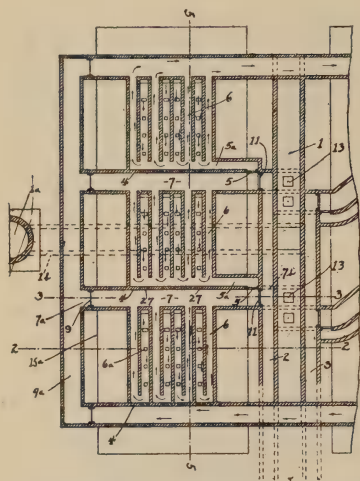
said table, an arm rotatably mounted on said machine coaxially with said table, a pin mounted on said arm, a member pivoted to said machine adjacent the periphery of said drum, a brake band encircling said drum, one end of said band being fixed to said machine and the other end being fixed to said member, a plate pivoted to said machine coaxially with said member and extending across the path of motion of said pin, and resilient adjustable means preventing the rotation of said plate away from said path of motion without rotating said member. In a glass molding machine, a rotating molding mold table and rotating blowing mold table, a plurality of molds on each of said tables, means for rotating intermittently each of said tables, the edges of said blowing mold table projecting over the edge of said other table, whereby as said tables are actuated one of the molding molds comes to rest immediately under one of said blowing molds in the elevating position, means for successively elevating glass means from said lower molds to said upper molds when they are in the elevating position, said elevating means comprising an elevating member, means for passing said member downwardly through a blowing mold before said member reaches the elevating position, means for lowering said elevating means onto said glass mass after the mold comes to rest in the elevating position, means for then elevating said member while supporting said glass through the blowing mold, in combination with means for blowing said glass mass in the blowing mold while still supported by said elevating means and as said mold is being moved to other positions. In a glass molding machine



means for transferring molded articles from said machine, said means comprising a lever mounted for rocking in a horizontal plane, rocking means connected to said lever, clamping means fixed to one end of said lever, a second lever mounted on said lever and for horizontal rocking, means for opening and closing said clamp fixed to one end of said second lever operable as said lever is rocked, means fixed to said machine for rocking said second lever as said first mentioned lever is rocked in one direction, and other means fixed to said machine for rocking said second lever as said first mentioned lever is rocked in the other direction, and means for locking said clamp in its closed and its open positions.

Heavy Clay Products

Quality of common brick manufd. in Japan. SAKUHEI KOBAYASHI. *J. Jap. Cer. Assoc.*, 32 [374], 57-68(1924).—In Jan., 1922, the Brick Committee of the Engineering Stand. Comm. of the Jap. Govt. resolved to investigate on the quality of common brick manufd. in the country and, thereafter, 115 kinds of common brick made by 18 works have been tested in the Tokio Industrial Lab. The author summarizes the results obtained by Mr. Maruta and Mr. Nakai. Conclusions are: 1. Crushing strength of common brick manufd. at a plant increases as their absorption decreases. Absorption is, however, never a measure of crushing strength for brick manufd. at different works. 2. The crushing strength-absorption curve indicates that Japanese brick can be classified in (1) those with crushing strength over 350 kg., (2) those with the strength from 350 to 200 kg. and (3) those having the strength under 200 kg. per sq. cm. Absorption of class (1) is less than 9% for brick of Western districts while it is within



ously moving row of brick, a conveyor having a series of equidistant and transverse grooves capable of being moved transversely with respect to the row of moving brick, means for automatically and intermittently advancing said conveyor, a pivoted conveyor for transferring the brick from said moving row to one of said receiving grooves, automatic means for swinging the free end of said pivoted conveyor to transfer brick to an adjacent groove when the first said groove has become filled, and means for returning the transfer conveyor to its original position of movement simultaneously with the advance of the said transversely moving conveyor.

Refractories

Determination of thermal conductivity of refractories. M. HERSEY AND E. BRITZLER. *J. Wash. Acad. Sci.*, **14**, 147(1924).—The condy. was detd. using the same type

of heaters as had been done in previous work. The condy. was calcd. by $\frac{K}{AG} = \frac{H}{AG}$ where

H = heat flow through area A and G = temp. gradient and this is $G_0 = \frac{t_1 - t_2}{x}$ where

x = thickness of layer of brick between two isothermal planes t_1 and t_2 . G may be calculated by $G = G_0 \left(t + \frac{dG}{G_0} \right)$ with $\frac{dG}{G_0} = 4 \left(\frac{t - t_m}{t_1 - t_2} \right) t_m$ = observed temp. of interior, $t =$

$\frac{t_1 + t_2}{2}$, t_1 and t_2 are hot and cold face temp., respectively. The values of Hytex and

Georgia fire brick were obtained and found to be for Hytex 0.0029 (cgs.) at 260°C and 0.0027 (cgs.) for Georgia at 945°C and 0.0019 at 290°C.

S. S. C.

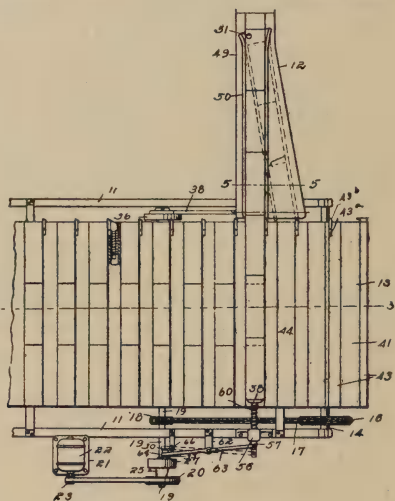
14% for those of Eastern districts. Absorption of class (2) is 9–14% for Western brick and 14–18% for the Eastern.

S. K.

PATENTS

Brick kiln. HENRY WEBSTER. U. S. 1,491,180, Apr. 22, 1924. In a kiln, the combination of a firing chamber, means for firing said chamber along the sides thereof, a main flue, another chamber having a solid, permanent wall between it and the first chamber, a space between the two chambers having a valved connection between it and the main flue, and direct communication with the one chamber, and valved connection with the other chamber, said other chamber having likewise a connection with the main flue.

Device for handling and arranging brick. HALVER R. STRAIGHT. U. S. 1,492,864, May 6. In combination, means for conveying a continu-



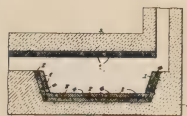
Texture and heat conductivity of refractory stone. M. JAKOB. *Z. Ver. deut. Ing.*, **67**, 126-7(1923); cf. *C. A.*, **16**, 2187.—The differences reported by various observers (references to which are given) in the heat condy. of MgCO_3 , some values differing 20-fold, can be explained by differences in cryst. texture. It should, therefore, be possible, by suitable mixing and heat treatment, to control the heat condy. and temp. coeff. of ceramic products. In this connection the condy. can be increased by the addn. of graphite (cf. *Ann. chim. phys.*, **25**, 137(1912)). C. C. D. (*C. A.*)

BOOK

Refractories for Electric Furnaces. 2nd ed. Columbia Univ., New York: Am. Electrochem. Soc. 96 pp. \$1.00. (*C. A.*)

PATENTS

Refractory lining for metallurgical purposes. EDWIN W. HALE. U. S. 1,492,685, May 6. As an article of manuf., a container for molten metals and other materials, the portions of the lining of which container most liable to be exposed to the destructive action of the molten materials and gases are faced with bricks made of an alloy containing chromium.



Refractory product. ARTHUR P. TAYLOR. U. S. 1,491,567, April 22. As a new article of manuf., a refractory product consisting substantially of diaspore and kaolin and having a fusing point greater than cone 35, substantially as described.

Refractory article and process of making the same. HUGH S. COOPER. U. S. 1,491,224, Apr. 22. A refractory article consisting of zirconia bonded by relatively fusible impurities therein, said impurities being present in amounts not substantially impairing the refractory properties of the article.

Whitewares

Suspension insulator for trolley lines of industrial railways. F. BIELEFELD. *Elek. Zeits.* [1], 6-8(1924).—A new type of porcelain insulator D. R. P. 325,488 designed for mine trolley wire support combining good insulation with high mechanical strength is described. The feature of this insulator is the fact that the suspension pin is anchored within the porcelain by means of an expanding conical shaped head eliminating cement, the expansion being caused by screwing the tubular suspension pin down on an imbedded conical shaped head inserted in the porcelain, thus spreading the pin. J. T. L., JR.

The umbrella type insulator, new transmission high tension line insulator. W. WEICKER. *Elek. Zeits.* [9], 155(1924).—A new type of pin insulator for voltages up to 80 k. v. is described which claims the advantages of a form conforming to the lines of the electrostatic field, can be used on short light pins, has a rugged construction, and also has a great resistance to temperature changes. These insulators are manufactured by Hermsdorf-Schomburg Insulator Co. of Germany in various sizes. J. T. L., JR.

The 1,000,000 v. testing equipment of the Hermsdorf-Schomburg porcelain insulator factory of Freiburg (Sa.). O. NAUMANN. *Elek. Zeits.* [9], 177-80(1924).—The first equipment in Europe for testing up to 1,000,000 v. is described. The plan of the Laboratory as well as app. for testing is shown both by photographs and drawings. Flash-over photographs at 1,000,000 v. on different types of porcelain insulators are reproduced. J. T. L., JR.

The solution of the cement problem in the construction of insulators. ERNEST ROSENTHAL. *Elek. Zeits.* [15], 333-4(1924).—High tension insulator failures are found to be largely due to volume changes in the cement. Changes in design of the insulator so that the stresses due to this change were distributed and not localized gave

considerable improvement in service and in strength tests. Since ordinary Portland cement has a thermal expansion coefficient of four times that of porcelain this was decided to be an important source of trouble. However, when this was compensated for by adding a grog to the cement which gave it an expansion coefficient equal to that of porcelain no better results were obtained. Curves are given showing volume changes in cement over a long length of time and it is concluded that moisture absorption of the cement is the controlling factor. By means of adding a pitch composition (Pech-smelzkopern) to the cement and heating to a relatively high temperature, the pores of the cement are closed and moisture absorption and consequent volume change are eliminated.

J. T. L., JR.

Laboratory watch glasses of porcelain. H. KREIS. *Schweiz. Apoth. Ztg.*, **61**, 594(1924).—Watch glasses of white or black porcelain, the manuf. of which K. had suggested for use in special reactions, are now obtainable.

S. W. (C. A.)

Industrial filtration. I. British chamber and frame presses. S. G. URE. *Chemistry and Industry*, **43**, 136–41(1924).—In this survey the following are dealt with: (1) types of plates, (2) washing the cake, (3) drying the cake, (4) filter cloths, (5) filter aids, (6) closing devices, (7) materials of construction, (8) number of chambers, (9) feeding the filter press. The article is illustrated with 9 cuts of presses and parts.

E. G. R. (C. A.)

PATENT

Acid-proof cement lining for digesters of sulphite pulp. NAOKI TAKATA. U. S. 1,492,866, May 6. The method of making an acid proof, rapid setting cement ingredient for use in lining a sulphite pulp digester, consisting in mixing substantially 60 parts of white clay, substantially 10 parts of lime, substantially 3 parts of asbestos and substantially 6 parts of borax, heating such mixture, powdering the product after cooling, and admixing the same with substantially 10 parts of lead oxide powder.

Equipment and Apparatus

Peripheral-discharge cylindrical mills. A. W. ALLEN. *Eng. Min. Jour.-Press*, **117**, 325–8(1924).—Many designs have been made for ball and tube mills using perforated linings, with outer, fine screens, arranged to screen out and discharge the fines and return the oversize to the interior compartment of the mill for further grinding. Some of these mills have been fairly successful, but difficulties, such as clogging and excessive wear of screens and liners have narrowed their field of usefulness. The chief disadvantage in such designs is that holes or slots cause weakening of the lining and direct contact with balls tends to cause burring and clogging of the openings. An important recent development is embodied in the Forrester-Rexman rod mill, in which the rods are cradled at two points on cast spiders and do not touch the perforated lining at all. The rods are divided into four separate bunches by four compartments in the supporting spiders. A trunnion-extension scoop picks up the feed, together with water, if wet grinding is practiced, and the material falls onto the rods which roll together, supported at two points by the spider liners. The revolving mill causes the usual abrading action between the rods. The crushed material falls onto the bottom of the mill and passes through the coarse-screen lining, onto a fine screen around the outside. Oversize from the fine screen passes back into the inner compartments by special openings. The rods wear no more at the two cradle supports than at other points. Clogging and wear of screens are much lessened by this design.

B. M. L.

Dust control in crushing plants important. G. E. LYNCH. *Eng. Min. Jour.-Press*, **117**, 165–7(1924).—The control of dust is nearly always a profitable investment. It always improves working conditions, with increased efficiency of labor and reduced turnover. Very often valuable material is recovered in dust collection. In crushing

plants and others producing large amounts, dusting should first be reduced to the lowest possible min. and then equipment provided for collection of dust unavoidably produced. Study of air currents, ventilation and design of dust collecting equipment are discussed.

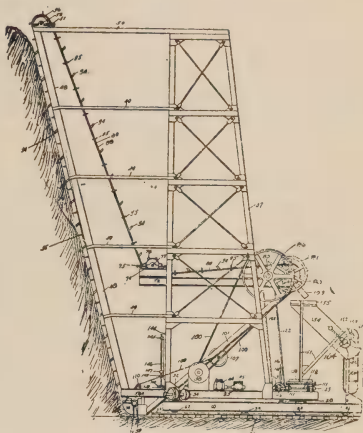
B. M. L.

A contribution to the thermodynamics of drying. F. MERKEL. *Z. Ver. deut. Ing.*, **67**, 81-4, 106-8(1923).—By means of the principles of thermodynamics, involving a large amt. of mathematics, diagrams are developed for detg. directly the *heat consumed and the thermal efficiency of drying processes*. Such a method can also be applied to heat exchange in general, such as the *humidifying of air, cooling by evapn., the vaporization of liquid fuels and the drying of air by cooling*.

C. C. D. (C. A.)

PATENT

Excavating machine. THEODORE AULMANN. U. S. 1,492,060, April 29. In a device of the class described, a platform, a movable frame on said platform, an excavator member on said frame, capable of moving downwardly to the floor line to loosen the material to be excavated, then upwardly to deliver it to a hopper, means for moving said excavator member transversely in either direction, pivoted gathering means for each side of said excavator member, adjacent to the floor, and means for alternately raising and lowering said gathering means.



Kilns, Furnaces, Fuels and Combustion

Sulphur as an index to ash fusibility. J. A. MURRAY. *Power*, **59** [15], 561(1924).—From the results of 1163 detn. made at the Detroit Edison Co. it appears that there is a marked relation between the sulphur content of coals and the softening temp. of its ash. Although sulphur, in itself, is not the cause of low fusibility, but rather the iron, it appears that the percentage of iron as Fe_2O_3 in coal usually varies with the percentage of sulphur.

C. J. H.

Coal shortage. ANON. *Keram. Rund.*, **32**, 164(1924).—The present coal shortage has proved fortunate to the porcelain industry since it has stimulated the investigation of more economical firing methods which has resulted in a reduction of fuel cost of about $\frac{1}{8}$ below that of the prewar cost. German porcelain is made of domestic kaolin and Norwegian quartz and feldspar. Investigations of kaolin washings have shown that the materials washed from the kaolins in some cases were more valuable than the kaolin itself. This sediment was found to contain radium and is now being used as a source of the mineral. Slag from blast furnaces which was formerly thrown away is now made into Portland cement. Fine minerals are found in the sediment of kaolin washings which produce a porcelain-like body at cones 14 to 16. It is suggested that this material be used as a substitute for Norwegian feldspar.

H. G. S.

The utilization of waste heat in the ceramic industry. OTTO BRANDT. *Tonind.-Ztg.*, **48**, 190-2(1924).—Methods are described for utilizing the waste heat of rotary cement kilns for firing boilers. Installations are also described for utilizing the waste heat from ceramic kilns for firing boilers and drying ware.

H. G. S.

The firing of porcelain by means of masut. ALBERT GRANGER. *Céramique*, **25**, 167-70(1922).—Experiments were conducted to det. the value of masut as a fuel for firing ceramic wares. G. concludes that masut would make a good substitute for wood in firing porcelain. The advantages claimed for masut as compared with wood are:

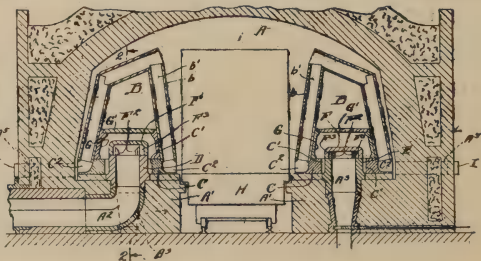
greater flexibility, good control of the kiln atmos., and greater economy. It is especially suitable for firing to high temps. H. G. S.

Loss of heat from furnace walls. ROBERT CALVERT AND LYLE CALDWELL. *Ind. Eng. Chem.*, **16** [5], 483(1924).—The authors call attention to the probable cost of ht. waste in U. S. industry and point out methods of reducing these losses. Method for detg. ht. condy. of various ht. insulating mats., with formulae and sample calcs., is given. Effect of varying size of pore spaces in ht. insulating efficiencies from work of Mellor is carried through to the work of Kreisinger and Ray, proving futility of so-called "dead air" space in fur. walls as ht. insulator. Firmness of bonding and differences in "hard burned" and softer, or unburned, insulating brick are noted. Data for various insulators and refractories show that a layer 0.5 in. to 1.5 in. thick, of the various insulators, has an insulating value approx. equiv. to 9 in. of fire brick or silica brick. The thermal condy. of insulators varies with the temp. of use, the density, unevenness of distribution of pore spaces, the temp. to which the mat. has been subjected during manuf. and, possibly, with the elasticity. Temp. gradients through the walls follow roughly the slopes calcd. from the thermal conductivities. The surface emissivity of a wall, as affected by its color, texture or compn., is probably a small factor in ht. losses from high temp. fur. The adjustments of temp. undergone by the outer face of the wall, in order to emit to the air the varying ht. transmitted to its surface, are so small as not to make any appreciable change in the temp. gradient between the outer and inner faces of the wall and it is this gradient that detcs. the ht. loss. The need of insulation for the efficient opern. of a fur., increases with an increase in fur. temp. A list of some of the valuable contributions already made to the field of ht. economy, concludes the article. R. D. L.

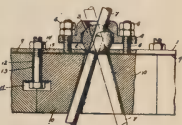
PATENTS

Gas-burning kiln. JOHN W. SNOW. U. S. 1,493,944, May 13. A kiln, comprising the combination of side walls, a tile-inclosed chamber within and spaced from said side walls to provide flues between said chamber and side walls, said chamber being open at the bottom, a horizontally extending partition beneath said chamber and provided with an enlarged aperture, fuel-gas-and-air mixing means extending freely through said aperture to direct a flame towards said chamber, and an aperture provided in one of the side walls to admit additional air to pass through said partition apertures and unite with the gas and air mixture above said partition in the region of the flame.

Burner for furnaces. PHILIP D'HUC DRESSLER and LUTHER T. STROMMER. U. S. 1,491,587, April 22. The combination with a combustion chamber, of means for passing combustible gas into said chamber comprising a gas supply conduit extending into the combustion chamber and having an elbow bend at its discharge end, and means for causing a decarbonizing fluid stream to flow along the outer or concave side of the internal surface of said elbow bend, and means for supplying air to said chamber for the combustion of gas supplied thereto by said conduit.



Poke ball for gas producers. ALBERT L. GALUSHA. U. S. 1,491,795, Apr. 22. In combination with a fire-box or chamber of a gas producer of the kind described and having holes in its top, of perforated metal poke balls covering said holes, caps securing the balls loosely in position and attached to the top of the fire-box by oppositely placed bolts, and lugs or projections at points on the under side of said caps of a length slightly less than the distance between the cap and the top of the fire-box.



Geology

The mineralogy of the feldspars. II. HAROLD L. ALLING. *Jour. Geol.*, **31** [3], 282-305(1923).—Thermal diagrams of the potash-soda series of feldspars are presented. The binary system of leucite, $KAlSi_3O_8$ and SiO_2 is given. Dimorphism of orthoclase-microcline, albite and "barbierite" is discussed. Eighteen photomicrographs of feldspars are shown. Important discoveries have been made on adularia moonstone and sanidine by means of the X-ray spectroscopy. (To be continued.)

T. N. McV.

The final consolidation phenomena in the crystallization of igneous rock. R. J. COLONY. *Jour. Geol.*, **31** [3], 169-78(1923).—Pyrogenetic processes are classified: (a) effects produced within the igneous rock mass itself, and (b) effects produced by the end stage consolidation products upon the neighboring rocks into which these matters have been forced. The effects produced within the igneous rocks are due to molecular changes in the various minerals which crystallize during consolidation, in part to actual reactions occurring between minerals already crystallized and the magma, and in part to reactions between the extreme end stage products of crystallization, and the almost consolidated rocks. Twelve photomicrographs illustrate very clearly the various changes that have taken place.

T. N. McV.

The physical chemistry of the crystallization and magmatic differentiation of igneous rocks. J. H. L. VOGT. *Jour. Geol.*, **31** [3], 233-52(1923).—The viscosity of various silicate melts at the same temp. and press. greatly vary. Viscosity decreases as temp. increases. A very good discussion is given of the effects of various oxides upon the viscosity of slags. Orthoclase (or microcline) and albite are characterized by extremely high viscosity just above the melting point. Microcline is very viscous several hundred degrees above the melting point. Anorthite above the melting point has medium viscosity. The melts between albite and anorthite show intermediate viscosity. Melted SiO_2 is extremely viscid. All silicate melts above 60% SiO_2 show increasing viscosity. The viscosity that characterizes a complex silicate may be derived from the viscosity which is characteristic of each component. If it is desired to obtain correct ideas as to the size of minerals crystallizing large molten masses must be used. Minerals of low viscosity crystallize faster than those of high viscosity. Compositions in the neighborhood of eutectics further the formation of glass. Two of the important factors of crystallization are time and viscosity. A comprehensive discussion is given on the equilibrium between the solid and liquid phase of mixed crystal components as applied to the formation of plagioclase.

T. N. McV.

The coloring of smoky quartz. B. L. VANZETTI. *Gazz. Chim.*, **54**, 95(1924).—Analytical methods were used to find the colorant and thought to be due to a trace of Mn, Ti and C. The theorized methods, to be due to soln. of colloidal Au. The crystals then studied petrographically and conclusions arrived at were that this might be due to some dissociated Si and inclusion in formation of the crystals giving a chromatic effect. Illustrations of the petrographic slides are shown.

S. S. C.

Chemistry and Physics

Effect of long grinding on quartz (silver sand). R. C. RAY. *Roy. Soc. Proc.*, **102**, 640-2(1923); *Sci. Abst.*, 2522(1923).—It has previously been shown from detn. of the heats of solution that when quartz is subjected to grinding for a long time in a mech. operated agate mortar it partially loses its cryst. structure and is converted into the vitreous state (abst. 385, 1923). The diff. between the mol. hts. of soln. of quartz and vitreous silica indicated that 31.2% of the mat. is converted into the vitreous state by 15 hrs. grinding. The expts. described in the present paper were undertaken to test the suggestion that a measurement of the d. of the ground and unground mat. ought to show a diff. if any considerable change takes place. It is found that the d. of the ground subs. is lower than that of the unground. The fall of d. shows that as much as 25.7% of the mat. is converted from the cryst. to the vit. state after 15 hrs. grinding. This value agrees fairly well with that arrived at from detn. of the mol. hts. of soln. A. F. G.

The product of the dehydration of kaolin. V. AGAFONOFF AND W. VERNADSKY. *Comptes Rendus*, **178** [13], 1082-4(1924).—There are 2 viewpoints on the product of kaolin dehydrated between 450° and 550°C. (1) A mechanical mixt. of Al_2O_3 and SiO_2 . (2) A homogeneous body of the compn. $\text{Al}_2\text{Si}_2\text{O}_7$. The expt. made places the homogeneity out of doubt. (a) A study of white kaolin from Algeria showed a homogeneous appearance of shining particles under the microscope. The anal. is SiO_2 —46.65, Al_2O_3 —40.17, Ignition—14.0. The theoretical is SiO_2 —46.5, $\text{H}_2\text{Al}_2\text{Si}_2\text{O}_7\text{H}_2\text{O}$ —39.5, Ignition—14.0. The product of dehydration was obtained in an elec. fur. between 450° and 550°C. (b) The d. of the powders detd. in bromoform was kaolin—2.58–2.59, the dehydrated kaolin 2.32–2.38. These powders are perfectly homogeneous in liquids. An artificial mixt. of Al_2O_3 and SiO_2 powdered after htg. to 550–600° is heterogeneous and the SiO_2 floats while the Al_2O_3 sinks in bromoform of d. 2.75. (c) The product of dehydration is homogeneous under the microscope. The htg. does not sensibly change the appearance of the powdered kaolin. The index of refraction is kaolin 1.555 and the dehydrated kaolin 1.513. (d) The powdered kaolin and its product both take an intense coloration in methylene blue soln. and are homogeneous while the artificial mixt. so treated remains heterogeneous. The SiO_2 takes no color while the Al_2O_3 becomes colored. (e) The conclusion is that after ignition at 550°C, the kaolin gives a homogeneous product $\text{Al}_2\text{Si}_2\text{O}_7$. The decompn. into Al_2O_3 and SiO_2 does not take place. The product $\text{Al}_2\text{Si}_2\text{O}_7$ thus obtained is sol. in acids. W. R. K.

Action of heat on kaolins, clays, etc. A. BIGOT. *Comptes Rendus*, **176** [2], 91-3(1923).—Tests were made on a number of ceramic mats. to det. the effect of heat on the colloids. The mats. were dried, ground to pass a No. 200 silk screen. Two series of test pieces were prepd. (1) Soft plastic condition; (2) Semi-dry powder moistened with 4 to 8% water and compressed at about 375–400 kg./sq. cm. These were htd. at different temps., some being reground after successive htgs. and the decrease in plasticity noted. The conclusions are: Plastic ceramic mat. under the action of heat, undergo a hardening, without dehydration or vol. change; this hardening comes from a partial pectization of the colloids. After dehydration and above 700°C a phys. change occurs, accompanied by shrinkage, and the mat. becomes harder, at the same time the colloids are destroyed. Non-plastic mat. hardens at about 1000°C after complete dehydration which has taken place around 650–700°C. The phenomenon of pectization plays a considerable part in ceram. W. R. K.

Fused kaolins and bauxites. A. BIGOT. *Comptes Rendus*, **178** [6], 569-71 (1924).—The note starts a study of the chem. transformation of kaolin and bauxites by fusion. The fused product does not devitrify easily at elevated temp. as is the case

with fused SiO_2 . Four photomicrographs are given as illustrations. A white bauxite "A" containing 21% SiO_2 htd. to 1710°C starts to undergo a transformation. The figure shows nodules without clear cut crystn. The same "A" heated above 1900° changes to a crystn. mass composed of sillimanite $\text{SiO}_2\text{Al}_2\text{O}_3$ and corundum Al_2O_3 . The figure shows well defined crystals. A red bauxite "B" low in SiO_2 and high in iron fuses below 1700° and changes to crystals of corundum which appear distributed in a black magma. A kaolin "C" heated above 1800° changed to a cryst. mass of sillimanite in a vitreous medium. The anal. are:

| | "A" | "B" | "C" |
|-------------------------|-------|-------|-------|
| SiO_2 | 21.55 | 3.33 | 53.91 |
| Al_2O_3 | 69.15 | 69.20 | 43.95 |
| Fe_2O_3 | 3.41 | 21.18 | 0.59 |
| TiO_2 | 5.69 | 4.65 | 0.59 |
| CaOMgO | 0.48 | 0.75 | 0.48 |
| Alks. | 0.13 | 0.18 | 0.65 |

If we suppose the SiO_2 in "A" to be combined at the moment of fusion with enough Al_2O_3 to go completely to sillimanite, there is formed 58.2% sillimanite and 32.6% Al_2O_3 remains of which a part crystallizes, while the rest combines with other elements forming the amorphous body. It is possible that the amorphous mass contains SiO_2 , for nothing proves all the SiO_2 has been changed to sillimanite. "A" has had its full shrinkage in fusing. It is refractory, abrasive and very resistant to phys. and chem. action. Its application is in refrac. products. The crystals formed when "B" is fused are more abrasive than "A" and are used as an abrasive. "C" is as refrac. and abrasive as "A" but has no industrial application. If we suppose that all the Al_2O_3 of the fused "C" is combined with the SiO_2 we find 69.81% sillimanite and 28.05% fused SiO_2 which is combined with the other elements. It is probable that all the Al_2O_3 has not crystd. and part stays combined with the vitreous SiO_2 . The transformation into sillimanite at high temp. has an application of particular interest to porcelain insulator manuf. where the insulators are used for the support of wires carrying high voltage and high frequency. It is observed that the presence of these needle-like crystals increases to a great degree the resist. to rupture under the action of sparking. The authors are further researching to observe how kaolin behaves when known proportions of Al_2O_3 and SiO_2 are added before fusion. W. R. K.

Rapid method for determination of potassium. M. BULLI AND L. FERNANDEZ. *Giorn. Chim. Ind. ed App.*, **6**, 60(1924).—The method is adapted for K in sol. Using 50 cc. of sol., 5 gr. of $\text{Pb}(\text{NO}_3)_2$ are added to ppt. SO_4 , CO_3 . To filt. 15 gr. of NaNO_2 are added forming $\text{NaPb}(\text{NO}_2)_3$. 2-3 cc. of $\text{Co}(\text{NO}_3)_2$ is then added forming $\text{PbK}_2\text{[Co}(\text{NO}_2)_6]$ which is pptd. out as microcrystals. The crystals are collected in a Gooch crucible and then dissolved in 50 cc. of $N/10$ KMnO_4 and 1 cc. of dil. H_2SO_4 and after a half hour 2-3 cc. of H_2SO_4 added. The excess of KMnO_4 is titrated out with $N/20$ $\text{Na}_2\text{C}_2\text{O}_4$ and the total no. of cc. of KMnO_4 used in ppt. is multiplied by the factor 0.0006517 giving the value for K in gr. This method was used on several types of products and a good check value obtained. S. S. C.

On Seger cones. RYOICHI SHIGEMUNE. *J. Jap. Cer. Assoc.*, **32** [374,] 41-4 (1924).—A short historical survey on the manuf. of Seger cones in Germany, U. S. A. and Japan is given. Then, the works of H. A. Seger, H. Hecht, M. Simonis and Shepherd-Rankin on the relation between their m. p. and chem. or mineral compns., as well as those of Robert B. Sosman and Hoffmann-Meissner on the effect of hgt. time upon their m. p. are discussed. In conclusion, the author urges the specif. of their manuf. in the country. S. K.

Oxidase reaction of Japanese acid clay, fuller's earth, and Florida earth. KYUHEI KOBAYASHI and KEN-ICHI YAMAMOTO. *J. Chem. Ind. (Japan)*, **26**, 289-96(1923).—Japanese acid clays, fuller's earth, and Florida earth, but not kaolin, kieselguhr, or volcanic ash, give the oxidase reaction with an alc. soln. of guaiaicum, and with other substances. It is supposed that the so-called Helmholtz double layer is formed around the surface of the clay when suspended in water and that it absorbs hydroxyl ions, H ions being liberated near the surface. The hydroxyl ions thus absorbed combine directly, liberating 1 atom of O and forming water. This active atom of O may act on oxidizable reagents and give the oxidase reaction. J. C. S. (C. A.)

Alumosilicates. V. VERNADSKII. *Brit. Assoc. Adv. Sci. Rept.*, **1923**, 435-6.—Alumosilicates are divided into *anhydrides* (Al_2SiO_5 , $\text{Al}_2\text{SiO}_4\text{F}_2$, etc.), *acids* ($\text{H}_2\text{Al}_2\text{Si}_2\text{O}_8$ — H_2O , $\text{H}_2\text{Al}_2\text{Si}_4\text{O}_{12}$, etc.) and *salts* ($\text{K}_2\text{Al}_2\text{Si}_6\text{O}_{16}$, etc.), all of which can form *addn. products* ($3\text{CaAl}_2\text{Si}_2\text{O}_8 \cdot \text{Ca}(\text{OH})_2$, $\text{CaAl}_2\text{Si}_2\text{O}_7 \cdot \text{O}_8$, Ca_2SiO_4 , etc.) where the aluminosilicate group dominates the properties. The salts and their addn. products can be divided in 3 groups: (1) *sillimanite salts* of the acid $\text{H}_2\text{Al}_2\text{SiO}_6$ and their addn. products (chloritoids); (2) *leuerrierite salts* of the acids $\text{H}_2\text{Al}_2\text{Si}_{2+n}\text{O}_{8+2n}$ where $n = 0, 2, 4, 6, 8$ ($\text{K}_2\text{Al}_2\text{Si}_2\text{O}_8$, $\text{K}_2\text{Al}_2\text{Si}_4\text{O}_{12}$, etc.), whose addn. products have the general formula $pAqB$ where A = aluminosilicate, B = group of elements of secondary importance, $p = 1, 2, 3, \dots$ and $q = 1$ or 2 (all compds. have a *chromogene constitution*, a *common nucleus* $\text{M}_2\text{Al}_2\text{Si}_2\text{O}_8$, give *clays on weathering* and are obtained by natural and synthetic reactions from kaolinite) and which are represented by zeolites, feldspars, nephelines, garnets, epidote, scapolites, etc., and (3) *salts of polybasic acids of the anhydrides* Al_2SiO_5 , $\text{Al}_2\text{Si}_2\text{O}_7$, . . . (chlorites), including mostly hydrated Mg and Fe compds. Melilites, polygorsaites, etc., do not belong to the aluminosilicates. C. C. D. (C. A.)

The use of measuring vessels at temperatures varying from the normal. G. BRUHN. *Z. angew. Chem.*, **37**, 51-2(1924).—The vol. of the Mohr l. depends entirely upon the temp. at which this unit is measured, while the normal l. is independent of the temp. The expansion of the glass vessel and of the liquid contained in it are compensating errors, and the total error in the use of graduated flasks at temps. other than the normal is thus reduced to a small figure. T. S. C. (C. A.)

BOOK

GARDNER, WM.: **Chemical Synonyms and Trade Names.** London: Crosby Lockwood and Son. 25s. net. Reviewed in *Chem. Trade J.*, **74**, 172(1924). (C. A.)

PATENT

Water glass and its process of production. LOUIS SCHNEIDER. U. S. 1,493,708, May 13. The process of making water glass by mixing in a dry state caustic soda with an incompletely dehydrated-silicic-acid-hydro-gel and subsequently adding water to produce the desired concentration.

General

Making long life molds. *Foundry*, **52** [8], 294-7(1924).—Various mixt. for making semi-permanent molds are given, with results obtained from them in fdry. tests. Molds made of fused alumina, mixed to a paste with water, gave good results on medium sized gray iron castings. Molds made of zircon showed an effective saving over the ordinary sand mold. M. E. M.

The combustion of fuel in dust form. A. B. HELBIG. *Feuerungstechnik*, **12** [11], 86(1924).—Attempts to increase burning efficiency and approach the highest temperatures theoretically possible with various fuels under ideal conditions have so far been hampered owing to the lack of a suitable refractory for furnace linings. The softening point of clay fire brick is given as from 1200-1400°C, and of silica brick 1600-1650°C followed by very rapid softening above this temperature. Magnesite brick

start to soften at 1500°C but very gradually so that at 1700° they still have some resistance long after silica brick have melted down. This has lead to the development of the Delbag pressure furnace the side walls of which are built of refractory brick perforated with very fine holes (4200 per sq. m.). The entire furnace is surrounded by an air jacket under slight static pressure ($\frac{3}{8}$ –2" water). Pulverized fuel, oil or gas are introduced into the furnace with just sufficient air for suspension of the particles, the balance of the air for combustion being introduced through the pinholes in the walls. Advantages claimed are: (1) Brick lining cooled below softening point; (2) Layer of air covering surface of brick protects them from deposit of products of combustion; (3) Incoming air is preheated as it passes through the brick in a thin stream and combustion is extremely rapid on entering furnace; (4) Losses through radiation and conduction extremely low on account of air film covering furnace walls. With this furnace continuous temperatures considerably over 1700°C have been reached.

F. A. W.

The constitution of basic slags:—Its relation to furnace reactions. T. P. COLCLOUGH. *Jour. Iron Steel Inst.*, **107**, 267(1923).—Author gives plain statement of facts with data to support them, which should be useful to workers in ferrous alloys especially steels. Principle adopted in the tests in this investg. was to study the effect of slags of diff. compn. on the impure metal of the bath and, by studying the relative rates of elimination of the various elements, to form a concept of the reactions which occur and of the nature of the products formed. Tests carried on in 50 to 60 ton capacity open-hearth furnaces using mixtures of scrap and hot metal from an "active" mixer. Limestone added with the charge in all cases, in some cases no oxide was added until the desired type of slag had been obtained, some time after the charge was melted. The conclusions arrived at are given as follows: (1) Slag formed in a basic open-hearth furnace is essentially tetra-calcic-phosphate of lime with monosilicate of lime, magnesia and manganese oxide. (2) Additions of acid "oxides to such slag causes instability and leads to a return of phosphorus to the metal." (3) Additions of basic oxides merely pass into solution and type of compound is not altered. In certain cases there is probably a compound of lime and ferric oxide formed which is comparatively stable. (4) When an excess of lime is present, MnO is carried into solution and, under certain conditions, is reducible to manganese. (5) The relative rates of oxidation of carbon and phosphorus depend primarily on the basicity of the slag, and there are two critical compositions: (a) When the total bases are sufficient only to form the slag given in (1) there is no further oxidation of phosphorus, and carbon is eliminated. (b) When the lime content is sufficient to form the silicate and phosphate, carbon remains constant until nearly all the phos. is eliminated. (6) The removal of sulphur is only indirectly due to the presence of a high lime content—the direct agent is manganese, which is thrown into the bath from the slag.

H. G. W.

Clay industry in Saskatchewan. E. L. CHICANOT. *Eng. & Min. Jour.-Press*, **116**, 107–8(1923).—The province of Saskatchewan, Canada, has a healthy and growing clay-products industry. Imports of such products into Canada in the last year were valued at \$6,778,365 about half of which came from the United Kingdom, and slightly less from the U. S. Exports have been negligible, the Canadian products being intended almost entirely for domestic market, and were valued at \$8,335,900 in 1921. Brick, tile and earthenware clays, refractory clays and ball clays burning nearly white have been found in Canada, Saskatchewan having a large share of these. Recently a large deposit of china clay has been located in Saskatchewan and plans are in prospect for a plant to produce chinaware and electrical insulators. A course in ceramic engineering has been instituted in the University of Saskatchewan to insure a supply of technical experts for the growing ceramic industry.

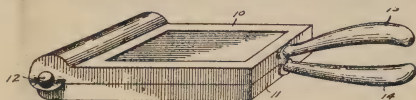
B. M. L.

The non-metallic minerals and chemicals used in the pulp and paper industry. L. H. COLE. *Can. Min. Jour.*, 45, 158-60, 236-9 and 258-61 (1924).—This series of three articles gives a very complete review of all the non-metallics used in the equipment, process and products of pulp and paper manufacture. Necessary properties and important specif. are given, and Canadian sources of these materials (such as sandstone, clays, soapstone, silica sand, asbestos, limestone, magnesite, talc, etc.) are discussed.

B. M. L.

PATENT

Ceramic product. JOHN SCHUMACHER. U. S. 1,492,753, May 6. The process of making a ceramic product comprising mixing silica and water glass to form a plastic substance, placing the plastic substance in a mold, and baking said substance in the mold to the fusing point of said substance.



BOOK REVIEWS

Archaeologist and Potter. The pottery produced by the Greeks has afforded a fascinating field of study for a long period of years. Probably no phase of ceramics has proved more fruitful as to its bearing upon history and art. The extent of existing collections and the great variety of examples, extending as they do over many centuries of production, have emphasized the importance of this source and while the evolution of method and style has been exhaustively studied it has been for the most part without accurate technical knowledge on the part of the investigators. The author of the work under review¹ says in her preface, "The neglect of this highly valuable source of information (the practical knowledge of pottery) has led to some surprising theories regarding the technique of Greek vases; and these theories have been repeated over and over again in our books on vases, for the simple reason that, not having any first hand knowledge, we have copied these statements from one another."

Thus Miss Richter has had the courage to acknowledge the situation and to place herself in the position of a beginner in the art of the potter. Her recently published book is the outcome of this endeavor and she has certainly succeeded in placing the work of the Grecian potters in a new light.

Miss Richter joined the summer school of pottery at Alfred, New York, during two successive seasons and learned how to make, with her own hands, vases similar to the Greek. (Fig. 1.) Her most important contributions to this study are two: first the demonstration that the Greek vases were turned



FIG. 1.—Greek vase with turned surface and marks of turning tools.

¹"The Craft of Athenian Pottery" by Gisela M. A. Richter, New York, Metropolitan Museum of Art, 1923.

on the wheel after being shaped and when they had reached the "leather hard" condition; and second, the fact, previously suggested by one of the German investigators, but not hitherto proved, that the Greek wares were fired only once (Fig. 2).

In addition to the interesting and comprehensive explanation of processes the book contains numerous contemporary illustrations of Grecian potters at work. Some of the actions noted are now for the first time satisfactorily described and explained and finally the closing pages are occupied with the most complete series of classical extracts on pottery that has ever been published. This in itself is a valuable contribution to ceramic literature and will be valued by those who see in clay something more than a possible brick or dish. That the ancients were sensible of the close connection between plastic clay and humanity is quite evident from several of the quotations, as for instance this from Plato given on page 92.

"Is not this, as they say, to learn the potter's craft by undertaking a pithos (that is a large jar) and does not this seem to you a foolish thing to do?"

CHARLES F. BINNS.



FIG. 2.—Drawing showing interior of Greek kiln.

The Coal Formation Clays of Ohio. Fourth Series, Bulletin 26, Geological Survey of Ohio, in coöperation with The United States Bureau of Mines. By WILBUR STOUT, R. T. STULL, WM. J. MCCAUGHEY, and D. J. DEMOREST. 1923. 588 pages. Price, \$1.50, net.

A very complete text covering the history of the clay industries in Ohio; the stratigraphy and distribution of the coal formation clays of Ohio, their mineral and chemical composition, their physical properties, including firing behavior data and a complete analytical table covering the essential properties; the methods used in the microscopic analyses, the chemical analyses and the laboratory tests of the clays; the listing and description of the accessory minerals, their behavior during firing and a new theory of the Origin of Coal Formation Clays.

The book is furnished with a complete index and table of contents which enhance its value as a reference volume. The text is in chapter form and is briefly reviewed as follows:

Chapter I.—History of the Clay Industry in Ohio, by W. Stout.—A brief history of the different types of ceramic wares manufactured including the names and locations of the various companies, the names of their respective founders, the dates organized, the sources of supply of raw materials, and the history of the various organizations down to the present time, together with a number of interesting plates of plants. Also a history of the first School of Ceramics in the United States.

Chapter II.—Coal Formation Clays of Ohio, by W. Stout, R. T. Stull, Wm. J. McCaughey, and D. J. Demorest.—A thorough treatise covering the stratigraphy, distribution and properties of the principal clay and coal-bearing horizons found in the various formations. This chapter constitutes the major portion of the volume and the material covered in it might well be considered the occasion for the publication.

Sections of the different formations are shown including the general description and thickness of the various members which are considered in ascending order. The distribution of the members is described by counties and townships. The economic value of each member is also given.

The factories in the field are noted together with the clays employed, the ware produced, and the plant capacity. A map is included showing the locations of the

various formations, the plants where samples have been taken, and the plants in operation.

Complete chemical analyses, including sulphur, total carbon and inorganic carbon, are given for the various clays. These analyses are the most complete and among the most accurate that have been made on coal formation clays. The percentage oxide ratio for each clay is also given, having the molecular equivalent of Al_2O_3 figured as unity.

The mineral compositions as determined by microscopic examination, are given for the most important clays. This constitutes the most important mineralogical work that has been done on coal formation clays. The range covered is from the purest to the most impure clay.

For the various clays are given results of physical tests including working properties and drying shrinkage; their complete firing behavior data including shrinkage, both linear and volume, volume absorption and color over a wide range of firing temperatures. The overfiring temperature, the best apparent burning range, the deformation temperature and the commercial possibilities are also given. These data as given should be of particular interest to ceramic men.

A very complete Analytical Table of the Coal Formation Clays of Ohio is included which should be especially valuable for ready reference. The chemical analysis and the majority of the properties above listed are found in this table.

A number of interesting plates, plants and mines are also shown.

Chapter III.—Testing of Clays, by R. T. Stull.—An explanation of the various steps employed and a definition of the expressions encountered in the thorough testing of clays.

The complete method of procedure used in making the tests on the Coal Formation Clays is outlined.

A classification of Coal Formation Clays is given according to their refractoriness as indicated by their deformation temperatures. A Classification of clay fire brick is also given.

There is also a very thorough explanation of the relation of the RO-SiO_2 content to refractoriness together with a figure on which the various clays tested are located according to their RO-SiO_2 content with their refractoriness indicated by a legend and zonal curve.

Chapter IV.—Influence of Minerals and Mineral Components in Clays, by W. Stout.—A description of accessory minerals and impurities common to Coal Formation Clays and the secondary compounds formed from them, and their effect on the firing behavior of the clays.

The change which firing produces in clays is thoroughly covered by excerpts from a former Ohio Geological Survey Bulletin written by Edward Orton, Jr.

Chapter V.—Mineralogical Examination of Coal Formation Clays, by Wm. J. McCaughey.—A valuation of the microscopic examination of a clay to determine its mineral composition which in turn will disclose the nature and distribution of the "impurities" of the clay.

A complete method of procedure is given for the necessary preliminary treatment of clays for microscopic examination. Oil immersion methods as used in the microscopic examination of clays is also described.

The accessory minerals of the Ohio Coal Formation Clays as determined microscopically are listed in the order of their abundance. The manner in which each mineral occurs is then described in detail. The clays examined are classified according to their accessory mineral contents.

Chapter VI.—Chemical Analysis of Clays, by D. J. Demorest. The complete method of procedure for making the chemical analysis of clays as followed in the analyses of the Coal Formation Clays of Ohio.

A list of constituents is also given which are liable to occur in natural silicates.

Chapter VII.—Origin of Coal Formation Clays, by W. Stout.—A new theory for the origin of Coal Formation Clays.

Many of the relationships of clay to coal are explained to substantiate the theory, as for example, the relation in composition of clay to coal ash. In general, the geological, chemical and physical features of coal formation clays are explained by this theory in a satisfactory manner.

The order of deposition under marine conditions of coal formation strata is shown in a figure.

PERRY D. HELSER

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CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the Editor of *Chemical Abstracts* by cooperative agreement.

Abrasives

PATENTS

Emery and sand cloth and paper. H. JACKSON. Brit. 208,389, Dec. 27, 1922. Waterproof sand paper, emery cloth, etc., are produced by treating the paper, etc., backing, after coating with glue, gelatin, or similar adhesive and before or after the application of the abrasive material, with alum, tannic acid, HCHO, dichromates, etc. The backing may be coated on one or both sides with the adhesive and abrasive. The backing may be rendered waterproof, at the same time as the adhesive, by the application of sufficient adhesive to impregnate the backing. (C. A.)

Adhesives. C. KRUG. Brit. 208,132, Nov. 23, 1923. A cementing or binding compn., particularly suitable for securing abrasive coverings to steel disks, consists of a mixt. of shellac with a substance such as an artificial resin, *e. g.*, a condensation product of phenol and HCHO, which increases its fluidity. The compn. may also contain a hygroscopic mineral such as chalk, heavy spar or pumice and a substance of great heat capacity, *e. g.*, Fe_2O_3 . A preferred method of prepn. consists in mixing equal parts of artificial resin, chalk, pumice and Fe_2O_3 and adding the mixt. to rather less than its own wt. of shellac. The product may be melted, stirred, solidified and ground. Cf. 10,374, 1913. (C. A.)

Abrasive for grinding and smoothing glass. W. L. KANN. U. S. reissue 15,796, Mar. 18. See original pat. No. 1,387,649, C. A., 15, 4043. (C. A.)

Cement, Lime and Plaster

Calculating the horse power consumed in (cement) ball mills. E. C. BLANC. *Rev. Mat. Constr. Trav. Pub.*, 174, 57-60(1924).—An empirical formula has been developed whereby the motive power necessary for rotating a ball mill is detd. from its dimensions, the wt. of the charge and a filling coeff., dependent upon the vol. occupied by the charge. The formula is $F = CT\sqrt{D}$, where F is the motive power in H.P., T the total wt. of pebbles, D the interior diameter of the mill, C the filling coeff., which depends upon the kind of pebbles (grinding medium) used, and also upon the filling ratio (ratio of vol. of charge to total (inside) vol. of mill). For cement grinding the values of C are:

| Grinding Medium | (Filling Ratio) | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 |
|--|-----------------|------|-------|-----|-----|-----|
| Flint Pebbles | | 13.3 | 12.25 | 11 | 9.5 | 7.8 |
| Steel Balls (large) for initial grinding | | 11.9 | 11 | 9.9 | 8.5 | 7 |
| Steel Balls (small) for final grinding | | 11.5 | 10.6 | 9.5 | 8.2 | 6.8 |

Example: Mill with 3 compartments. Diam. 1.65 m., length 8.2 m., internal diam. 1.565 m., rev. per min. 25; 1st compartment (1), length 2.775 m., 6 T. large steel balls, filling ratio 0.2; 2nd compartment (2) length 3.50 m., 4 T. flint pebbles, filling ratio 0.37; 3rd compartment (3) length 1.50 m., 6 T. small steel balls, filling ratio 0.45. The H.P. is calcd. for each compartment separately:

$$\begin{aligned}
 F_1 &= 11 \times 6 \times \sqrt{1.565} + 10\% = 91 \text{ h. p.} \\
 F_2 &= 9.95 \times 4 \times \sqrt{1.565} = 50 \text{ h. p.} \\
 F_3 &= 7.6 \times 6 \times \sqrt{1.565} = 57 \text{ h. p.} \\
 &\quad 198 \text{ h. p.}
 \end{aligned}$$

Actual power used 200 h. p. For corrugated (or step) surfaces on the interior, additional 10% h. p. is required as for compartment (1). L. N.

Cement making by the "mixing" process. G. H. *Rev. Mat. Constr. Trav. Pub.*, 176, 113-6(1924).—In principle the process is as follows: (1) Limestone of known compn.

is burned. (2) To the resulting quicklime the remainder of the necessary raw materials for making the cement is added. These raw materials may consist of clay or shist, and lime in the form of marl, lime sludge or the fines from the crushers. The moist. of the raw mats. added is made sufficient (by additions of water when necessary) to slake the quicklime. (3) After complete slaking the mixt. is ground, and (4) burned. Often the powdered coal used as fuel is added as a part of the raw mats. in operation (2). When inferior coal is used intentionally, consideration is given to the ash content added to the cement. (5) The clinker is ground, and the resulting cement is ready for bagging. It is claimed that the method is economical for the reasons that (a) the cost of drying the raw materials is reduced, (b) materials otherwise considered waste, as the fines from the crushers can be used, and (3) the cost of the final firing is also materially reduced.

L. N.

Fuel economy in chemical works. C. ELLIOTT AND H. W. HOLLANDS. *Chem. Trade Jour. and Chem. Eng.*, **74**, 277(1924).—The use of powdered coal in rotary driers and cement kilns is discussed. The rotary cement kiln is not an economical fuel consumer but is advantageous because it is continuous, saves labor, and yields better clinker. Producer gas may be used successfully in cement kilns and in some industries, and in sodium silicate manuf. is most economical.

P. W. K.

Alumina cement in France. EDWIN C. ECKEL. *Eng. News-Record*, **91** [9], 347-9 (1923).—Alumina cement was invented by Lafarge about 1908 in France. A French patent was issued and the claims read: 1. Process of cement manuf. consisting in melting in a water-jacket or similar furnace a mixt. of bauxite or of mat. primarily aluminous and ferruginous, but relatively little siliceous, with lime, the fused product being then rapidly hardened, then ground and finally pulverized. 2. The industrial product constituted by a cement with a bauxite base or from material primarily aluminous and ferruginous but relatively little siliceous, and lime, the content of lime being defined approx. by the formula $\text{SiO}_2\cdot 2\text{CaO} + \text{Al}_2\text{O}_3\cdot \text{CaO}$. Fifteen years of hard work have changed plant, processes and product so that those of 1908 are no longer recognizable in the modern industry. The European alumina cement industry of today is rather a matter of more or less secret processes than of patents. In France 300,000 bbl. were produced in 1922 and a production of 400,000 to 450,000 is estd. by 1924 which is 7% of the total Port. cement output of France. It is the average opinion of eminent engineers in France, Great Britain and the U. S. that in the next ten years alumina cement could be made and sold to replace from 10 to 20% of the Port. cement output. Alumina cement will always be more expensive than Port. but its use is justified where resistance to action of sea water or alkali waters is a factor and where quicksetting time saves money. There are two large companies in Great Britain contemplating mfg. of alumina cement under separate processes. In Paris today alumina cement costs three times as much as good Port., but repair work on first-class streets and bridges is all done with alumina cement. If the slow and economical French mind can see an advantage under such conditions, it is expected that in due time Detroit, Chicago and New York may also find it profitable to save time at the expense of first cost.

F. T. H.

Doubly burned cement. ANON. *Concrete* (Mill Sect.), **24** [4], 57(1924). From *Revue de Materiaux*.—A method of double burning cement, invented by C. Didier, has been in use in France for more than a year with complete satisfaction. The cement produced is superior in quality. The cement-mix is first heated to a temp. just sufficient to drive off all the CO_2 . The product is then hydrated, so as to produce an impalpable powder, and the latter is sieved and then burned as usual in a rotary kiln, or it is briquetted and burned in a shaft kiln. The process is advantageous where the limestone is hard and the clay wet so that dry grinding the raw mats. is impracticable.

F. T. H.

Atlas Aluminate Cement Company to manufacture alumina cement. ANON.

Concrete, **24** [5], 211(1924).—After months of exptl. mfg., the Atlas Aluminate Cement Co., with main office at 25 Broadway, N. Y. C., has announced that it is now prepd. to produce Lumnite, high alumina cement, at Northampton, Pa., in ample quantities to meet any demand as it develops. F. T. H.

Aluminate cement. HENRY S. SPRACKMAN. *Con. Rec. and Eng. Rev.*, **38**, 401-3 (1924).—Aluminate cement has two exceptional qualities that differentiate it sharply from all other hydraulic binders, namely the rapidity with which it attains max. strength and its perfect resistance to chem. attack by sea water and waters containing sulphate of the alkaline earths in soln. Aluminate cement concrete mixed 1 cement, 2 sand, 4 stone or gravel will give at 24 hrs. a resistance to compressive stress of 2000 lbs. per sq. in.; at 3 days, 5000 lbs.; at 7 days, 6000 lbs. This early strength gives it a great advantage in rapid alteration work. It is considered the cement of the future.

O. P. R. O.

Cement works (Tasmania). ANON. *Indus. Australian and Min. Stand.*, **71**, 469(1924).—Tasmania Cement Co. plant is about ready for operation; making cement was the original main object of the enterprise, using oil from the retorting of the shale as fuel. Tests made on the shale oil proved so successful that production of fuel oil, kerosene, and motor spirit is to be of primary importance, waste gases and some of the fuel oil are to be used in firing the cement kiln. Considerable deposits of limestone are available at Railton and it is proposed to use deposits of oil shale from Latrobe as an adjunct to the manuf. of cement. Under this plan of operation, the shale will be treated in a kiln, the oil obtained will be refined, the crudes being used in the manuf. of cement, various by-products will be recovered, and the shale residues will be ground and mixed with the limestone to form cement. The plant will produce 90 T. of cement a day; all the oils, motor spirit, kerosene and fuel oil will be put on the market. The retorts will treat 180 T. of oil shale a day, with an expected yield of 7,200 gal. of distilled oils. A quarter of this and the non-condensable gases will be used in firing the cement kiln, leaving 5,500 gal. of oils for the market.

O. P. R. O.

Portland cement. ANON. *Indus. Australian and Min. Standard*, **71**, 434(1924).—Development in the manuf. of Port. cement. The century of a great discovery. The history of the invention, with its developments from time to time; the mixing of raw materials; the wet process and the dry process are described. Calcining and the early types of kiln are discussed; the rotary kiln has done much to revolutionize the industry during the past twenty years. Cooling and grinding are dealt with. This article endeavors to show that Port. cement is a highly scientific product, the manuf. of which is under absolute control from beginning to end and checked at every stage. O. P. R. O.

PATENTS

Cements. A. PETELOT. Brit. 210,760, Jan. 22, 1924. Cements resembling stone, marble and pottery consist of a mixt. of ZnSO_4 , BaCl_2 , NH_4Cl , ZnO and SiO_2 , with or without limestone. In making the compn., the first three ingredients, dissolved in H_2O , and part of the ZnO are mixed together, evapd. to dryness, and heated to 340° , the remaining ingredients being added after cooling. (C. A.)

Bauxite cements. L. G. PATROUILLEAU. Brit. 210,366, July 23, 1923. Cements are obtained by treating a mixt. of lime or limestone and bauxite in a furnace, with the addn. of C to reduce metal oxides. After the first smelting the metallic pig or slag is removed by pouring or sorting, and the remaining alumino-silico-calcic slag is crushed, screened, and passed to a magnetic separator, which preferably comprises an endless band, with magnets so arranged as to allow the non-magnetic particles to drop from the band, while the magnetic particles remain adhering to it. By thus freeing the cement from metallic impurities, a const. proportion of lime, alumina, silica and as an accessory magnesia may be obtained. (C. A.)

Hydrating cement. E. P. HALLIBURTON. U. S. 1,486,883, March 18. Cement and liquid, *e. g.* H_2O , are mixed in a vacuum created by the action of a stream of the liquid. (C. A.)

Making of cement from blast-furnace slag. W. R. COCHRANE. Brit. 203,963. Blast-fur. slag and carbonate of calcium, chalk or other limestone are all broken to convenient size, pounded and shattered together to an amorphous powder, by means of blows from heavy gravity stamps. The object of this operation is to break down the vitreous structure of the slag by concussion and crushing, more completely and thoroughly than can be effected by any grind process or mere attrition. The finely powdered slag and limestone are floated out of the mortar into a wash mill, where it is kept suspended in water by constant stirring to dissolve and separate out the sol. sulphide of calcium. When sufficiently washed, the whole content of the wash mill are run into settling tanks, and when the solid matter is deposited the superfluous water is run off, carrying away the soluble impurities and leaving the residual slurry of slag and limestone practically free from sulphides. The consolidated slurry of slag and limestone is then removed from the settling tanks and calcined in kilns in the usual way. The resulting clinker is ground to the degree of fineness desired and this completes the process of making an improved cement from blast-furnace slag. *Coll. Guardian*, 1320(1923). O. P. R. O.

Weatherproof coating composition. R. PLÖNNIS. U. S. 1,487,471, Mar. 18. A coating compn. adapted for use on floors and walls is formed of K "water glass" 100, caustic alkali 3, $CaCO_3$ 5 and tar oil 5 parts. (C. A.)

Acid-proof binding material. AKTIEBOLAGET SYREFAST. Swed. 55,796, Dec. 11, 1923. A finely divided mixt. of a material contg. orthosilicic acid, PbO or other oxide of Pb , powd. brick, stone and asbestos or other "fat" Mg mineral is stirred up with water glass. (C. A.)

Enamel

Rotary spraying booth turns out 720 average pieces of enamelware hourly. INTERVIEW WITH MR. HOGENSON OF THE CHICAGO VITREOUS ENAMEL PROD. CO., CICERO, ILL. *Cer. Ind.*, 2 [6], 353(1924).—The new plant of the Chicago Vitreous Enamel Prod. Co. covers 100,000 sq. ft. of floor space. The equipment in the pickling room includes monel metal baskets, or hoists and individual drying rooms. By the use of baskets the ware is advanced in lots from one tank to another. The steel spray room is equipped with duplex spray booths, each equipped with individual motor and fan. In addition to their own requirements immense quantities of frit mixtures are made for the trade. The frits are tested in actual production before released. The capacity of each frit furnace is 1,000 lbs. of raw material. The smelting is completed in less than 2 hrs. One thousand or more smelts are made before the smelter requires relining. The smelter room is well equipped with app. for the removal of irritating fumes. The frit furnace men are given one week a month off during which time they are employed in less strenuous work. The frit smelters are operated with oil for fuel. The capacity of each smelter is from 12,000 to 22,000 lbs. per 24 hrs. There are two types of continuous sprayers used, the conveyor type and the rotary type. 720 pieces of flat ware are sprayed per hr. in the rotary machine. The minimum production of the cast iron spraying room is 24,000 lbs. every 8 hrs. Portable enamel tanks are used. Separate driers are used for the cast-iron and sheet-iron ware. Waste heat from the furnaces is utilized to heat the driers. The plant was originally equipped with coal-fired furnaces, each having a capacity of 1600 sq. ft. of sheet ware per 24 hrs. The cost of fuel, labor and upkeep was approx. \$22 per thousand sq. ft. Intermittent gas-fired furnaces were next installed. Their capacity was also 1600 sq. ft. of sheet ware per 24 hrs. The cost of firing ranged from \$26 to \$30 per thousand sq. ft. The carborundum

muffle type of furnace now in use in connection with the speed fork delivers 3000 to 4000 sq. ft. of sheet ware every 24 hrs. Oil, which is used for fuel, costs \$.06 per gallon delivered to the burners. The cost of firing ranges from \$3.75 to \$5.00 per thousand sq. ft. The cast-iron furnaces have a capacity of 12,000 lbs. of one fired ware every 24 hrs. The cost of firing is approx. \$.50 per thousand lbs. Bonuses are paid on all firing work in order to maintain a high standard both in rate of production and quality of ware. The shipping crates have been standardized in order to prevent damage to the ware and to eliminate wrapping. An allowance is given the addressee on returned crates. A sand blast barrel of the direct pressure type is used for cleaning. From 800 to 1500 stove legs are cleaned in this barrel per 8 hr. shift. Hose machines are used on larger pieces. The entire shop is operated with oil for fuel with duplicate equipment. Four 10,000-gallon tanks constitute the oil storage.

P. D. H.

The electrolytic removal of dust. J. P. McClaire. *Chem. Trade Jour. and Chem. Eng.*, **74**, 33(1924).—The rusty articles are used as cathodes in a bath contg. NaOH, Na₂CO₃, Na₂SO₄, and NaCN in soln. A current d. of 30 to 140 amp. per sq. ft. causes a rapid evolution of hydrogen, which reduces the rust in a few minutes. The process has been tried successfully on a commercial scale in England for reconditioning war mat.

P. W. K.

Falkirk uses new methods. H. C. Estep. *Foundry*, **52** [9], 331-39(1924).—Contains a description, illustrd. with photographs, of the application of the Beardsley and Piper Sandslinger to the manuf. of bath tubs, in the plant of M. Cockburn and Co., Falkirk, Scotland. Illus. with photographs.

M. E. M.

Enameling cast-iron ware in electric furnaces. H. E. Kennedy. *Chem. Met. Eng.*, **30**, 219-20(1924).—Description of an elec. fur. for enameling bath tubs at the plant of the Pacific Sanitary Co. Ribbon resistors of nickel-chromium were used, embedded in slots in the sides and over the top. After 2 yrs. operation no diminution in cross section was noticeable in the resistor. After the erection of the first fur., 3 duplex fur. were built, which are practically two fur. within a single arch. In these one tub is being preheated while another is being enameled. These stoves take 220 kw. No figures on production are given, but the statement is made that with oil at \$1.25 per barrel, the elec. heated tub is slightly cheaper. (NOTE: This would depend on the power rate, which is not given.)

M. E. M.

Heat transfer in enamel-lined apparatus. E. P. Postle. *Ind. Eng. Chem.*, **16** [5], 469(1924).—A report of observations on a wide variety of types of enamel-lined equipment operated under a wide range of conditions. Typical cases are covered on commercial units to illustrate what may be expected under various conditions and from these and other data, the following over-all coefficients of ht. transmission are given:

OVER-ALL COEFFICIENT OF HEAT TRANSMISSION

| Conditions | Kg. cal. per hour per sq. m. per °C | B.t.u. per hour per sq. ft. per °F |
|--|---|--|
| Steam to water being heated | 400 to 700 | 80 to 140 |
| Hot water to water being heated | 350 | 70 |
| Steam to boiling water | 700 | 140 |
| Steam to a thick fruit product | 160 | 32 |
| Cooling water by cold water and by brine | 200 to 600 | 40 to 120 |
| Hot oil to oil being heated | 65 to 140 | 13 to 24 |
| Hot oil to boiling water | 150 to 200 | 30 to 40 |
| Steam to water being heated in tubular heaters | 500 to 800 | 100 to 160 |
| Steam being condensed to water in tubular condenser jacket | 700 | 140 |

The thickness of the enamel coating, rather than the metal thickness, seems to be the detg. factor in the over-all coeff. of ht. transmission. The values stated are based on actual operg. conditions.

R. D. L.

PATENTS

Zirconium oxide concentrate and method of producing the same. CHARLES J. KINZIE. U. S. 1,494,426, June 3. In the derivation of zirconium oxide from mat. composed of compds. of zirconium associated with undesired sub., the steps which consist in mixing and htg. said mat. with sulphuric acid; adding water to production of a zirconium sulphate soln.; and adding to said soln. chloride of sodium.

Enameled ware. HAROLD F. WHITTAKER and THEODORE BAKER, U. S. 1,496,505. June 3. In the method of making chem.-resistant enameled ware having a metallic base, the step which comprises incorporating in the base material a metal capable of rendering the coeff. of expansion of the metallic base substantially the same as the coeff. of expansion of the enamel component of said ware, shaping said base mat. into the desired form, and applying thereto the enamel. As a new article of manuf. enameled ware having a metallic base and comprising an enamel having high chemical resistance and a relatively low coeff. of expansion, and a metallic base consisting of an alloy whose coeff. of expansion is substantially the same as that of the enamel. As a new article of manuf., an enameled iron alloy comprising an enamel whose components are present in the following proportions:

| | Per cent |
|--------------------------------------|--------------|
| SiO ₂ | 67.0 to 75.0 |
| B ₂ O ₃ | 4.0 to 24.0 |
| Na ₂ O..... | 4.0 to 8.5 |
| K ₂ O..... | 0.2 to 1.3 |
| CaO..... | .2 to 7.0 |
| MgO..... | .0 to 0.5 |
| Al ₂ O ₃ | .0 to 10.0 |
| PbO..... | .0 to 1.0 |

and an alloy having substantially the same coeff. of expansion as said enamel and contg. between 50 and 68% of iron and between 43 and 32% of nickel.

Glass

Use of phonolite in the glass industry. R. PFLOCK. *Sprech.*, 56, 355-6(1923).—Only those plants operate for long periods of time who have their mats. analyzed at frequent intervals. One should not wait until the quality of the product has dropped before doing this since in this case it may be too late. A portion of the glass industry at least has taken the advice of the chemist and has been greatly benefited. This was done by the substitution of phonolite in the place of soda in the glass industry. A phonolite is mined in Germany having the following analyses:

| | | | |
|--|-------|-------------------------------|------|
| Ignition loss..... | 2.26 | Lime, CaO..... | 2.45 |
| Silica, SiO ₂ | 60.50 | Potash, K ₂ O..... | 5.06 |
| Alumina, Al ₂ O ₃ | 20.30 | Soda, Na ₂ O..... | 6.29 |
| Iron oxide, Fe ₂ O ₃ | 2.99 | Magnesia, MgO..... | 0.08 |

A double truck of phonolite would be equiv. to the following amts. of raw mats.:

| | Kg. | | Kg. |
|--------------|-------|---------------|------|
| Sand..... | 12000 | Lime..... | 870 |
| Alumina..... | 4000 | Soda ash..... | 3400 |

Over 2,000,000 marks are saved in substituting a double truck of phonolite for a mixt. contg. soda ash. In addition to this, the cost of handling would be less since not so many mats. will have to be measured and added. The moist. content is practically 0 and the compn. does not vary much over long periods of time. Phonolite melts to a glass at 1150°C which is a lower temp. than a synthetic mixt. of this compn. would melt at. Also in working no difficulty is encountered in using this in semiautomatic and an automatic machine as one might expect from its high Al_2O_3 content. Heretofore because of its high Fe content it was used exclusively for bottle and green glass. Its resist. to atmos. agents, acids and alkalies make it useful for glass brick, tubing, accumulator glass, preserving glass, for all sorts of colored glasses used for chemicals and pharmaceutical purposes, for basins, window glass, pressed glass, glass fittings, and chem. app. The use of phonolite in the glass industry has resulted in an improvement in the quality and a reduction of the costs.

H. G. S.

Increase melting area—decrease repairs by insulating glass tank. ANON. *Cer. Ind.*, 2 [6], 349(1924).—Interview with W. K. Brownlee, Pres., Buckeye Clay Pot Co., Toledo, O. The insulation of a glass tank permits of lower operating furnace temp. with a given production. The outside walls of the furnace, being cooled by a strong air blast, chill the molten glass which sinks, whereas, the hotter glass in the center rises. That such convection currents do exist is confirmed from results of approx. tank wall readings made at the Bulb Plant of the Gen. Elec. Co. where a temp. differential of approx. 100°F per ft. of height in glass was noted from pyrometer readings taken simultaneously. Also very marked vertical lines of erosion are produced by the glass currents moving down the walls. A small test-tank furnace was built with flux blocks for the walls and floor and insulated throughout with $2\frac{1}{2}$ in. of Sil-O-Cel. The section of the test furnace is shown. The furnace was fed at the rate of 1500 to 1600 lbs. of batch without cullet per 24 hrs. and operated at 2500 to 2600°F for 30 days. The glass was ladeled out and the furnace allowed to cool. The insulation had equalized the internal tank temps. so as to obviate vertical currents with the consequent elimination of vertical erosion as shown in a view. The real significance of the insulation lies in the uniformity of glass temp. and lower average tank temp., rather than in any fuel saving, although this latter is quite marked. The approx. amount of heat lost through radiation in the average glass tank is 60 to 65%. Five to 6% of the heat generated is used to melt the glass. In the insulated tank, flowing action is maintained throughout the entire tank vol. This slower, though widely distributed movement, should effect a daily production equal to that of an uninsulated furnace, with its highly localized though relatively more rapid flow. The corrosive effect of the fluxes on the ports is minimized when the mass of glass progresses more slowly. The reduction of the heating temps. removes one of the most common causes of tank block disintegration. Clay tank blocks like clay pots should be burned to a higher temp. than the temp. used to melt glass, in order to eliminate subsequent shrinkage and minimize the absorption of alkali fluxes. This would mean that the dimensions of the blocks would have to be cut down in order to be fired successfully. Excessively thick blocks really constitute insulation and burn away readily to a comparatively thin section. The best construction for insulation is blocks that do not weigh over 125 lbs. and are not over 8" thick by 12" wide by 18" long or even less, 8" x 8" x 12". A photo of the interior of a tank shut down for repairs indicates that German tank blocks are inferior to the domestic product.

P. D. H.

Surface alteration in glass detected by high voltage currents. PAUL WOOG. *Le Verre*, 4, 54(1924).—In detg. the dielectric strength of liquid hydrocarbons the following phenomena were noted: The liquid was contd. in a thin cylindrical glass vessel 145 mm. high, 66 mm. in diam., filled to a height of 100 mm., standing on a circular

metal plate 114 mm. in diam. On top of the vessel was placed an ebonite strip holding in place through its center a brass rod 134 mm. long and 5 mm. in diam., terminating in a brass sphere 12.5 mm. in diameter. The brass rod (a 7 mm. length) and the sphere were immersed centrally in the liquid. An alternating current of 25 cycles was applied to the metal plate and the brass rod. With sufficient voltage a discharge was obtained, the current flowing from the brass rod to the surface of the glass, and over the surface to the metal plate. With a cylinder washed with dilute HCl, then with water, dried at 100°, then filled with an anhydrous mineral oil the resistance is high, but the moisture retained on the surface is sufficient to conduct the current and a discharge is obtained. With rise in temp. of the oil a corresponding lower discharge voltage was necessary, thus 11° 67,700 (volts), 20° 65,400, 40° 62,150, 60° 59,300, 80° 56,650, 100° 54,100. If, however, a hydrocarbon is used contg. a trace of water the discharge voltage decreases with the temp. on cooling the liquid, and then rises again on heating the liquid, *e. g.* (cooling) 18° 65,800 (volts), 16° 62,950, 14° 38,000, 12° 27,300 (heating), 12° 26,700, 14° 30,350, 16° 36,600, 18° 56,500, 20° 64,550. The explanation is given that the surface of the glass effloresces, liberating bases by the hydrolysis of the silicates. The carbon dioxide of the air causes the formation of a thin film of sodium carbonate. This salt crystallizes with 4 or 5 mols. of water at ordinary temp., but on cooling will form the hydrate with 10 mols. of water, if the water is available. The latter effloresces on heating when its *v. p.* is higher than that of the water vapor contained in the liquid. If this film is attacked by traces of free acid in the oils, the discharge voltage rises rapidly. By this method 1 part of water in 60,000 parts of oil can be detected. L. N.

Notes on the welding of glasses. LEON APPERT. *Le Verre*, 4, 25-9, 49-53 (1924).—After some historical notes A. discusses the properties which influence the welding together of glasses as in the casing of colored glasses, and the welding of glass and metal as in enamels. *Coeff. of Expansion:* Successful methods for detg. whether two glasses are sufficiently similar in their coeffs. of expansion to remain welded together without strain are given as follows: (1) A thin sphere (*a*) of glass V_1 is blown covered with an equally thin layer of glass V_2 , and another sphere (*b*) is blown having V_2 covered by V_1 . Let it be assumed that V_1 has the greater coeff. of expansion. If the coeffs. of expansion of these two glasses are much different in value, sphere (*a*) will usually shatter with a loud report into a number of pieces, which are smaller and more numerous as the coeffs. diverge. Sphere (*b*) will remain intact and will be found to be very resistant to repeated hard blows, cracking irregularly. In sphere (*a*) glass V_1 is under tension, while in sphere (*b*) it is under compression. When the spheres are tapped near the mouths of their openings, both will crack irregularly into a number of pieces, but sphere (*b*) will have more curved and irregular cracks. If the two glasses are alike in their coeffs. of expansion, the cracks will follow much straighter curves. (2) On the inner side of pieces of each of the two spheres scratches, fairly close together, are made with a diamond or steel cutting wheel. If the glasses are alike, the pieces can be parted along the scratches. In the present case sphere (*a*) will throw off splinters of glass at the cutting line as the scratching proceeds, while sphere (*b*) will only be scratched and cut with difficulty. Here again in sphere (*a*) glass V_1 is acting under tension, while in sphere (*b*) it is under compression. Skilled operators by these tests can differentiate between glasses varying in some of their chem. constituents by $1/25$, or by $1/250$ of the total batch wt. L. N.

Treatise on operating glass melting tanks. BJARNE SCHIELDROP. *Glass Worker*, 43 [31], 11; [32], 11; [33], 18; and [34], 18(1924).—Systematic ht. balance for checking operations is advocated. Daily records of gas analyses, regenerator and flue temps. will allow saving of fuel and improved quality of glass. Detail of ht. balance is given. The importance of stack losses, excess air, etc., is shown. Draught and gas velocities

should be calculated before the furnace is built. Complete data are necessary to correctly understand operation. R. J. M.

The history, development and commercial uses of fused silica ware. RICHARD A. S. PAGET. *Chem. Trade Jour. and Chem. Eng.*, **74**, 153(1924).—P. reviews the important advances made in silica ware manuf. and discusses the coeff. of expansion, devitrification, permeability, etc., of silica glass. P. W. K.

Glass-polishing by acids. OTTO W. PARKERT. *Diamant*, **46**, 187(1924).—An efficient and cheap substitute for polishing glass by stone or sand is to use an acid-bath of which the essential constituent is hydrofluoric acid. Other acids, such as sulphuric, hydrochloric, or nitric, may be added. A formula given is: 2 parts sulphuric, 1 part hydrofluoric, 1 part water. The ware is rinsed in soda solution, then washed with water, and placed in the acid-bath at 40°–60°C for thirty seconds. The process is handled with rubber gloves. H. H. S.

Clear fused quartz. E. R. BERRY. *Chem. Met. Eng.*, **30**, 715–17(1924).—Clear fused quartz, heretofore made only in small sections by hand labor in the blast flame, has now been made on a commercial scale by the Gen. Elec. Co. Water clear rock crystal contg. less than 0.2% impurities is the raw mat. The selected crystals are packed tightly in a graphite crucible, and raised rapidly to the m. p. in a modified vacuum fur. Fusion occurs within 45 min., with a power consumption of 3–8 kw.-hr. per pound of quartz. A clear, transparent slug containing a few small bubbles is obtained from this first fusion. This is placed in another graphite crucible suspended in a vertical carbon tube fur. A graphite piston with a wt. attached is placed on top of the slug which is again brought to fusion, the bubbles collapsed, and the quartz extruded in various forms. Its extremely low coeff. of expansion suggests many uses for this material. It is possible to transmit light through very great lengths of curved quartz rod with very little loss. M. E. M.

Fused silica. RICHARD PAGET. *Nature*, **113**, 748–52(1924).—A history of the development of fused silica from 1711 when tubes fused by lightning were discovered in Silesia by Hermann. In all the early processes, which are briefly described, it was essential to keep the temp. as low as possible, so as to avoid the reaction, which takes place at high temps. between silica and carbon, producing carborundum and evolving carbon monoxide. In 1903 a method was sought of fusing silica by means of elec. resist. or arc heating. It was accomplished in 1904 and from it was developed the present methods whereby fused silica is melted by means of an electrically heated carbon or graphite rod. When the fusion has been brought to the right degree of plasticity the rod is withdrawn, and the fusion is drawn, or blown by internal gas pressure, either freely or into a mold, or is pressed or rolled without reheating. The essential conditions are that the fusion shall not touch the rod, excepting at its relatively cool extremities. The most imp. property of fused silica is its low coeff. of expansion—being less than $\frac{1}{6}$ of that of the best Jena or Pyrex glasses and less than $\frac{1}{20}$ of the high expansion glasses. The relative expansion of rods of fused silica, glass and a metal is shown by illustrations of results of expts. at various temps. The phys. properties of fused silica are, briefly, it devitrifies less rapidly than silica mixed with any known subs.; d. of transparent fused silica is 2.21, while that of the opaque variety is 2.07; its hardness is of the same quality as hard glass; its elasticity is 6.6 kg. per mm. as against 6.0 for Jena glass; crushing strength about 7 T. per sq. in., *i. e.* between that of granite and blue brick; tensile strength of quartz fiber, provided the surface is unscratched, is 70 T. per sq. in. Its most interesting chem. property is its resistance to acids. This is shown by illus. of expts. Fused silica is unattacked by metals and metallic vapors in a non-oxidizing atmosphere; it is permeable to gases at high temps.; it has outstanding advantages as an elec. insulator, its resistivity at 150° being 500 times that of porcelain. In optical

properties it is noted for its high transparency to ultra-violet radiation, visible light, and heat. An expt. is described in which a fused silica rod 4 ft. long, and bent through 270° has one end heated to incandescence by an oxy-hydrogen blowpipe. The light passes through the length of the rod, being guided by internal reflection and emerges at the thickened opposite end as a colorless beam. The article is very instructive and well illusd.

O. P. R. O.

The physical properties of glasses. FRITZ ECKERT. *Jahrb. Radioakt. Elektronik*, 20, 93-275(1923).—A bibliography contg. 383 items is given. These are classified under the following headings: collective works; optical glasses and their optical consts.; dispersion of optical glasses; absorption of colorless glasses; absorption of colored glasses; action of the absorbed energy; the relation between refraction and the compn., pressure, and temp.; reflection and elliptical polarization; electro- and magneto-optics; elec. and magnetic properties; d., and heat expansion; heat and mol. properties; elastic properties; behavior of glasses at higher temp. The relevant matter in each reference is summarized and combined in the form of a comprehensive monograph.

R. H. L. (C. A.)

The glass industry. DELLOYE. *Génie civil*, 84, 89(1924).—A review of recent work, especially in America.

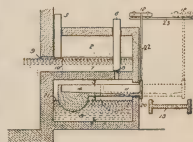
J. J. H., JR. (C. A.)

Sintered glass. ANON. *Nature*, 113, 579(1924).—Filter plates of sintered glass have been placed on the market by Messrs. Scott and Co., the Jena glassmakers, according to the *Chemiker Zeitung*. It is pointed out that these have many applications in all branches of chemistry, examples in analytical, preparative and electro-chemistry being quoted. Series of filters of stopping powers are marketed.

O. P. R. O.

PATENTS

Glass manufacture. ELMER DAVIS. U. S. 1,496,151, June 3. In app. for manuf. of glass, a tank having an extended end portion divided into upper and lower compartments for contg. molten glass, a closable port interposed between said compartments for the discharge of glass therethrough, a glass conveying trough normally positioned within the lower compartment having one end extended and supported by means outside of said compartment with its inner end supported by its own buoyancy in the molten glass, and positioned to receive molten glass discharged from said port.



Forming silica-glass articles. BRITISH THOMSON-HOUSTON CO., LTD. Brit. 207,457, March 16, 1923. A method of making articles of fused quartz consists in exerting a molding press on the quartz, while it is plastic, by the expansion that takes place when the quartz passes from one modification to another modification of lower density. Suitable construction is specified.

(C. A.)

Forming silica-glass articles. BRITISH THOMSON-HOUSTON CO., LTD. Brit. 210,707, Sept. 25, 1923. Articles from transparent quartz produced by extruding fused quartz through an orifice in a graphite container contain striae. The surface layer of the quartz is removed, before it is worked up into finished ware, by mechanical means or by treatment with hydrofluoric acid. Cf. C. A., 18, 1557.

(C. A.)

Heavy Clay Products

Building materials from waste. A. P. LAURIE. *Nature*, 112, 956(1923).—The large accumulations of blast furnace slag, cinders, clinkers and burnt shale in the vicinity of Edinburgh have given occasion for an investigation as to their utilization for building materials. They can be used for brick, cement, and as aggregate mixed with Port. cement or plaster of Paris. The general method adopted for the production of bricks

is known as the sand-lime process. Briefly, this process consists of mixing the aggregate with a certain proportion of lime and water, squeezing it into a brick under a pressure of some two hundred tons to the area of the brick and then steaming under high pressure or in open steaming chambers. Bricks are now being manufd. by this process from sand, blast furnace slag, granulated by being run while hot into water, clinker, town refuse, slate dust, and burnt shale from the Scottish oil shale dumps. O. P. R. O.

Refractories

Selection factors in choosing refractories for industrial plant use. O. A. HOUGEN. *Chem. Met. Eng.*, **30**, 737-41(1924).—Contains a table giving the phys. and chem. properties of 23 different refrac. mats. T. E. M.

American magnesite handicapped. ANON. *Iron Trade Rev.*, **74** [16], 1048 (1924).—Rich deposits of magnesite are on opp. side of this continent from largest consuming steel plants and cannot compete with Austrian imports. Domestic production rose with World War but declined with resumption of importation. Table on world production of crude magnesite showed Greece leading, with the U. S. second, for 1921 (Austria not included). Table of consumption in the United States shows 58% of total imported in 1921 as against 11% in 1917. R. D. H.

Best results secured by using fire brick of uniform thickness. M. S. GEREND. *Power*, **59** [21], 831(1924).—The advantages to be obtained by the use of fire brick of uniform dimensions are outlined. Drawings are given illustrating two types of calipers for use in sorting out brick of any specified dimension. C. J. H.

Properties required of refractories for heat treating furnaces. E. B. PRENTICE. *Fuels and Furnaces*, **2** [3], 283(1924).—It is impossible to secure a refractory embodying all of the characteristics reqd. in ht. treating furn., in a single material. The consumer should, therefore, carefully diagnose conditions with respect to temps., spalling, abrasion from charging ware, fluxing from metal scale or fumes from the use of case-hardening mats., etc., and then furnish the manufacturer a complete analysis of conditions in order that special mixts. may be made when necessary. Diffs. in requirements of hearths and piers are pointed out as examples. A refractory with sufficiently high fusion point to guarantee efficient results and allowing for an adequate "factor of safety," rather than one that just "gets by," should be chosen. Spalling can be largely prevented by using a refractory coating which raises the fusion point of the surface above the encountered temps. Fusion can be largely prevented by the application of a neutral coating or selecting a refractory high in alumina content and correspondingly low in silica. R. D. L.

Whiteware

New \$1,000,000 pottery contains wealth of modern plant equipment. ANON. *Cer. Ind.*, **2** [6], 359(1924).—Interview with A. V. Bleininger of the Homer Laughlin China Company, Newell, W. Va. The plant was designed after the inspection of a number of potteries in order that all new ideas of modern plant equipment might be considered. The bldg. is 800 ft. in length and 290 ft. in width. The plant is so arranged that the ware moves in one direction from the raw material bins to the packing room. The bldg. is of monitor type construction which gives excellent lighting conditions. The raw materials are unloaded from the cars to the bins by means of a clay unloader. A combined scale and batch car which travels on a narrow gage track is used to transfer the raw materials from the storage bins to the five blungers. The blungers are lined with vitrified paving brick which are placed in staggered formation in order to minimize the blunging time. The batches are blunged 40 mins. The slip passes from the blungers through a coarse screen and is then pumped into two rough brick-lined agitators above

the floor. The slip flows from the rough agitators over a rotary screen covered with IIXX silk lawn, flows by the magnetic separator, and into the storage agitator from which it is pumped to the five filter presses. These 72-leaf presses are refilled five times each day. The cakes are pugged in a horizontal pug mill, cut into 3-ft. lengths, of about 75 lbs. each, loaded into carts and elevated to the working floor where they are distributed to 17 jiggersmen. Approximately 1000 of the clay cylinders are required for one day's production. The clay body is not aged. A prepared clay storage is provided in a damp cellar from emergency only. The jiggers have individual motor drives. There are ten revolving stove rooms, heated with hot air to 120°F, which are used for the smaller ware. There are seven especially designed chain driers which have a capacity of 125 doz. 7" plate molds. The close regulation of the temperature eliminates the loss due to burned molds. Three men are used at each bench. Three stove rooms are provided for drying cups to the leather-hard stage. The cup lathes are driven by individual motors. The cast handle department is adjacent to the lathes. The casting slip is prepared in a separate blunger with the addition of .2% of a mixture of sodium silicate and soda ash in equal parts. The slip is supplied to the molds through flexible hose. The grog for the saggers is ground in a dry pan and screened. The material passing a 4-mesh and retained on a 16-mesh screen is used. The sagger body is prepared by soaking layers of grog and clay in pits and then pugging the mixture twice, at least 24 hrs. being permitted to elapse between the pugging in order to insure a uniform moisture content. The prepared body is elevated to the main floor by means of a belt elevator. The saggers are made by hand and on a sagger press. The daily hand production per man is 100 saggers, whereas the press production is 320 saggers. The saggers are dried in a hot air tunnel drier on steel pallets supported on suspended cars. It is expected, however, to utilize the waste heat from the tunnel kilns in the sagger drier. The overhead track makes a loop by the bisque kiln and back to the sagger room. The car platforms of the bisque kiln are at shop floor level which facilitates loading. The loaded cars before entering the kiln must pass through a pilot gate identical with a cross section of the kiln interior. The bisque kiln is 331 ft. in length and holds 53 cars. The kiln is operated on a schedule of 80 mins. per car. The car setting is 6 ft. in length by 5 ft. in width by 5' 4" in height. This allows extra saggers to be placed one high in the middle of the car. The capacity of the cars is 103 jack saggers. There are five furnaces on a side burning natural gas and equipped for oil as a substitute. The pyrometric equipment consists of one three-point recording potentiometer, one twenty-point indicating instrument, an optical pyrometer and pyrometric cones. The bisque is fired at cone 9. The bisque ware is unloaded on a belt conveyor from which it is sorted and placed in movable bins. The bisque is cleaned between revolving brushes. The glaze frit kiln has a daily capacity of 8 charges of 825 lbs. each. The frit is ground for 30 hrs. in 5 flintstone lined ball mills. After the glaze has been ground it is sieved through a rotary silk lawn, passed over a magnetic separator and into agitators from which it is pumped to the dipping line. The dipping is done from fixed tubs in front of 6 upright mangles each containing 51 shelves. The glost kiln is 301 ft. in length with the same cross section as the bisque kiln. There are four furnaces on each side. The kiln is operated on a schedule of 40 mins. per car. Kiln atmospheric conditions are checked by means of the Orsat app. The same pyrometric equipment is used on the glost kiln as on the bisque kiln. The glost ware is fired to from cone 3 to 3½. It is handled like the bisque as it leaves the kiln. The decorated ware is fired in a tunnel decorating kiln on a 15-min. schedule to a temp. of about 1400°F. The kiln has a daily capacity of 3000 dozens of ware. For this production less than 300 gallons of oil or 24,000 cu. ft. of natural gas are required. The plant has a daily production of over 5000 dozens of semi-vitreous dinner ware.

P. D. H.

- Porcelain as an insulator in electrical engineering. G. BENISCHKE. *Keram. Rundschau*, **32**, 215-6(1924). H. G. S.
- Study of the manufacture of electrical porcelain. E. E. URBAN. *Keram. Rundschau*, **32**, 217-9(1924). H. G. S.
- The development of insulators including questions on the construction of the same. W. WEICKER. *Keram. Rundschau*, **32**, 219-21(1924). H. G. S.
- The use of porcelain in the construction of high tension insulators. C. H. BAY. *Keram. Rundschau*, **32**, 221(1924). H. G. S.
- The testing of high tension insulators. BRÉDOW. *Keram. Rundschau*, **32**, 222-5(1924). H. G. S.
- Regarding the mechanical properties of porcelain. E. GEROLD. *Keram. Rundschau*, **32**, 225-6(1924). H. G. S.
- Cements for insulators. H. LUFTSCHITZ. *Keram. Rundschau*, **32**, 226-7(1924). H. G. S.
- Stoneware as an insulating material in electrical engineering. E. E. URBAN. *Keram. Rundschau*, **32**, 229-30(1924). H. G. S.
- Heat economy in the manufacture of electrical porcelain. F. GRAAFEN. *Keram. Rundschau*, **32**, 230-1(1924). H. G. S.
- The insulator question in the modern wireless broadcasting station. B. FREUND. *Keram. Rundschau*, **32**, 232-3(1924). H. G. S.
- The lifetime of porcelain insulators. W. CORDES. *Keram. Rundschau*, **32**, 234-6(1924). H. G. S.
- The development of the German electrical porcelain industry. W. HUTH. *Keram. Rundschau*, **32**, 236-7(1924). H. G. S.
- The million volt test for porcelain insulators at the porcelain factory in Freiberg, Saxony. O. NAUMANN. *Elektrotechn. Z.*, **45**, 177-80(1924); 12 illus.—A detailed account of the installation. C. G. F. (C. A.)
- Improvements in porcelain insulators. E. ROSENTHAL. *Elec. World*, **83**, 575-6(1924). C. G. F. (C. A.)

Equipment and Apparatus

Repair of leaky calorimetric resistance thermometers. J. D. DAVIS AND H. M. COOPER. *Ind. Eng. Chem.*, **16** [6], 579(1924).—The writers describe and illustrate the construction of calorimetric resistance thermometers, pointing out the advantages of use and difficulty in usual method of repair. They have found a rapid and easy method to repair this type of thermometer when moisture has been introduced into the case. The thermometer case is opened by cutting the solder joint at the lower end of the case and the glass drying capsule is removed, thus leaving the case open at both ends. A test tube large enough to contain the thermometer tube and glass outlet is filled with paraffin at about 130°C and the thermometer tube is immersed in the hot paraffin, the temp. being maintained for about 30 min., or until bubbles of air and steam are no longer evolved. After this, the tube still containing the thermometer is allowed to cool and finally broken away from the solidified paraffin. This is carefully chipped away from the thermometer, the tip is resoldered and the head sealed again with De-Khotinsky wax and the thermometer is ready for use. The drying tube may, of course, be eliminated. Thermometers that have developed leaks and have been sealed in the above manner have shown no change in the ice point, proving that the original characteristics have not been altered. The lag for one degree temp. change is not appreciably changed, this being about 5 sec. R. D. L.

Design and operation of a colloid mill. W. A. McLEAN. *Chem. Met. Eng.*, **30**, 675-7(1924).—Describes a mill invented by F. J. E. China, of London, and used com-

mercially for a year. The mill will disintegrate solid, plastic, or liquid masses into colloidal particles whose dimensions are one micron or less in diam. In design the mill consists of a rotor with a smooth face upon the frustrum of a cone, turning within the similar surface of a stator, the whole enclosed in a casing. Thus there are two variables in operating the mill; the clearance between rotor and stator, which may be from 0.002 in. up, and the speed of rotation, which may vary from 1000 to 20000 r. p. m. Solids must first be ground to about 150-mesh and suspended in a liquid medium. The centrifugal action of the rotor sucks the liquid through the inlet at the bottom of the mill, through the space between rotor and stator, and out through a discharge above the rotor. From 1 to 2.5 tons of feldspar per hour may be ground to colloidal fineness, with the passage of 3.5 to 5 T. of water medium. A discussion of the disruptive forces used by the mill is given, together with figures on power consumption. M. E. M.

Continuous grinding in the ceramic industry. ANON. *Chem. Met. Eng.*, **30**, 783-4(1924).—A description of the new plant of the Amer. Grinding Co. Feldspar, silica and clay are ground by a continuous process, to —200 mesh. The raw mat. is ground wet in a Hardinge mill, passes through 2 Dorr classifiers and a Dorr thickener, is dewatered on a vacuum filter and delivered to a tunnel drier. M. E. M.

Industrial kinetic elutriation. L. ANDREWS. *Chem. Trade Jour. and Chem. Eng.*, **74**, 403(1924).—A. describes an elaborate "kinetic" fractionating elutriator. The water suspension is forced, at high velocity, tangentially into a stationary annular chamber. The centrifugal force on the suspended particles in this rapidly rotating liquid gives the initial sepn. The fractions are further purified 2 or 3 times by ordinary gravitational elutriation. P. W. K.

The determination of the viscosity of highly viscous substances. E. BERL, M. ISLER AND A. LANGE. *Z. angew. Chem.*, **37**, 128-31(1924).—A simple app. is described for the accurate detn. of the viscosity of highly viscous materials. It consists in measuring the time required to withdraw a plunger immersed in the material a short distance under the influence of the force exerted by a known weight. The plunger is suspended from the left-hand side of a balance arm so that it dips a given distance into the viscous material. Weights are added to the right-hand balance pan until the balance is in equil. in this position. A certain addl. weight is then added and note made of the time required for the balance pointer to swing from the equil. position over a given no. of scale divisions. F. I. B. (C. A.)

Kilns, Furnaces, Fuels and Combustion

Automatic control of a tunnel kiln. I. P. DRESSLER. *Fuels and Furnaces*, **2** [1, 2, 3], 33, 125, 249(1924).—This is a series of articles describing the opern. of a Dressler car-tunnel kiln burning spark plug porcelain at the plant of the Champion Porcelain Company, Detroit, Mich. The 1st article deals largely with a general description of the construction of a Dressler car-tunnel kiln and is accompanied by photographs illustrating the subject matter. Mention is made of the ht.-resisting qualities of present-day porcelain ware for spark plugs and the necessity for accurate burning control, both as to temps. and atmospheres in the kiln. Method of controlling the gas pressures by installation of a sensitive regulator in the main line is given. Since the gas supply was made up of coke-oven, retort and carburetted water gases, which are pumped in either singly or mixed, some device had to be developed for overcoming wide variations in B.t.u. content of the gas supply and also varying densities when attempting to maintain the proper reducing, neutral or oxidizing atmospheres at the proper points in the kiln. The 2nd article deals with the description of the app. devised and successfully used for this purpose and is also accompanied by drawings and photographs. The 3rd and last article describes the mechanism developed for controlling the auxiliary burners which determine the kiln atmospheres. Electrical CO and CO₂ meters now

available have been found inadequate, because as successive bungs of saggars come opposite the gas sampling points, due to the movement of the cars, a very distinct variation in the gas passing into the recorders takes place and this has the effect of throwing out any adjustment depending on the reading. The articles offer a very interesting and informative description of the methods utilized in controlling burning where the utmost efficiency must be combined with absolute uniformity of a product possessing exacting requirements which is produced under definitely known conditions. R. D. L.

Geology

Steatite. ANON. *Keram. Rundschau*, **32**, 233-4(1924).

H. G. S.

The gypsum deposits of southwestern Persia. J. V. HARRISON. *Econ. Geol.*, **19**, 259-74(1924).—The paper records field observations on the occurrence of gypsum in southwestern Persia, with special ref. to the light they throw upon the origin of the deposits of this mineral. Proof is available that it has been produced in part by chem. replacements of limestone. Porous variable limestones of Persia are regarded as deposited from soln. subsequent to the gypsum in which they occur. The gypsum occurring with the Eocene limestone is regarded as due entirely to the metamorphic action of sulphur-bearing soln. from the mudstones upon the limestones. Some of the Fars gypsum owes its origin to a similar chem. action on the limestones of that formation and some to deposition from evapg. soln. The metasomatic gypsum has been forming since Pliocene times and continues to form at the present day. C. W. O.

Bauxite and laterite occurrences (India). ANON. *India Geol. Surv. Memoirs*, **49** [1], 287.—A well-balanced survey of the known facts regarding the bauxites and laterites of the world. Mr. Fox discusses in his 1st chapter the mode of occurrence, physical characters, mineral constitution, chem. compn., origin, age and economic uses of bauxitic laterites. His 2nd chapter is a detailed description of the occurrences in India, and the third chapter is a summary of the facts known regarding the bauxites and laterites of extra-Indian countries. The final chapter gives a summary of the chief points of each paper of importance previously published on the subject. In dealing with the constitution and origin of bauxite, F. has made a definite advance upon the previously recorded ideas, for he has applied the newly developed science of colloid chemistry to the constitution of bauxite, and has directed attention to the remarkable way in which the lateritic hill-caps in Peninsular India fringe, as well as lie on, the Deccan trap area and probably represent the decomposition product of the trap and its outliers.

O. P. R. O.

Chemistry and Physics

New method of making the Koerner rational analyses of clays. G. KEPPLER AND H. IPPACH. *Sprechsaal*, **56**, 356-7(1923).—The Koerner method of conducting rational analyses (*Sprechsaal*, p. 775 (1903)) is exact, rapid and economical in chemicals. In this method the colloidal silica remaining undissolved is removed with a 0.5% HF soln. This requires the use of a 250-300 cc. platinum dish which is too costly. K. and I. modified this method so that the cheaper hard rubber casseroles may be used instead. There is a big difference in the ht. condy. of the hard rubber and platinum casseroles. A platinum casserole with a certain amt. of water at 17°C when placed upon a water bath reaches 80°C in 2 mins. and 91°C in 5 mins. while a hard rubber casserole with the same amount of water reaches 28°C after 5 mins. and only 60°C after 30 mins. In the new method allowance is made for this difference in ht. condy. of the types of materials. 0.5 gr. of pulverized clay is placed in a casserole and 75-100 cc. of H₂O are added. The clay is thoroughly stirred until no lumps are present. After adding 10 cc. concd. H₂SO₄ the mixt. is covered with a watch-glass and allowed to

stand a number of hrs. in air and then is strongly heated over an asbestos gage after which the H_2SO_4 is volatilized. The residue is treated with H_2O on a water-bath during which treatment the bases go into soln. The SiO_2 and the feldspar remain as the residue. After filtering through a double filter the residue is thoroughly washed with a 0.5% HCl soln. The residue from the filter is transferred to a hard rubber casserole (20 cm. in diam. with a wall 3 mm. thick) and 200 cc. of boiling H_2O together with 2.5 grs. 40% HF , stirring with a hard gum rod. After stirring for 2 mins. the HF is neutralized by adding NaOH drop by drop. The quartz and feldspar are then removed by double filtration. The residue is washed first with H_2O , then with HCl and then again with H_2O . By volatilizing the SiO_2 and detg. the alkalies the feldspar content can be detd.

H. G. S.

Permeability of building materials to gases. ENGINEERING COMMITTEE OF THE BRITISH FOOD INVESTIGATION BOARD. *Chem. Trade Jour. and Chem. Eng.*, **74**, 122 (1924).—The permeability of bricks, plasters, concrete, and other building mat. was measured, using air, coal gas, and CO_2 . Great differences were found even in the same mat. The vol. of gas flowing through a wall in unit time was found to be propl. to the area and pressure difference and inversely propl. to the thickness. Various coatings and paints were also tested for their effectiveness in reducing the permeability.

P. W. K.

Colloid chemistry. E. K. RIDEAL. *Chem. Trade Jour. and Chem. Eng.*, **74**, 127 (1924).—A gen. survey of the chemistry of solids dispersed in gases or liquids is given, including a discussion of the electric endomose of clay.

P. W. K.

The modern concept of solid solutions. Z. JEFFRIES AND R. S. ARCHER. *Chem. Met. Eng.*, **29**, 923-6, 966-9 (1923).—The authors have compiled the accepted theories of solid solns., and give a brief discussion of their formation and properties. The question is handled entirely from the metallurgical standpoint.

M. E. M.

Investigation of the thermal dissociation of the hydrated aluminosilicates, prehnite, zoisite and epidote. E. NORIN. *China J. Science & Arts*, **1**, 390-403 (1923).—These minerals when exposed to heat dissociated into compds. sol. in HCl . The progress of the dissociation was detd. by 20 mins. extn. with 7% HCl . The amt. of SiO_2 liberated was detd. by 20 mins. extn. with 5% soda soln. Dehydration curves are drawn. The dehydration temps. detd. are: prehnite $725-50^\circ$, zoisite $900-70^\circ$, epidote $900-1000^\circ$. The H_2O in prehnite is shown to be constitutional.

W. H. A. (C. A.)

Aluminium-titanium alloys and the influence of titanium on aluminium. E. VAN ERCKELEN. *Metall u. Erz*, **20**, 206-10 (1923).—Al-Ti alloys contg. up to 30.7% Ti corresponding to the compd. Al_4Ti have been investigated. This compd. forms neither eutectic nor solid soln. with Al, the solidus in the series being a straight line at 657° , the m. p. of Al. The liquidus rises very sharply, with increase in the Ti content, in a smooth curve to a max. at 1325° and 30.7% Ti. The alloy with only 2% Ti commences to solidify at about 1000° with the sepn. of Al_4Ti , followed by freezing of pure Al. The microstructure of the alloys shows needles of very hard Al_4Ti embedded in a soft ground-mass of pure Al. The effect of Ti on the tensile properties of Al is to increase the ultimate strength up to about 1%, then rapidly to reduce it. The hardness, sp. elec. resistance, and resistance to corrosion are all increased with increase in the Ti content. The chief value of Ti in Al alloys would appear to be in its great affinity for N and O; by the removal of these impurities the phys. properties of the metal are greatly improved.

(C. A.)

Plasticity. I. OTTO RUFF. *Z. anorg. allgem. Chem.*, **133**, 187-92 (1924).—Plastics may contain one or several components. Fine grinding undoubtedly helps develop plasticity, but the most important factor is the development of an active surface on the particles by means of a sol-forming agent. Acids are most effective with basic oxides

and bases with acidic oxides. A certain concn. of H or OH ion is most effective as a sol-forming agent. Cf. Podszus, *C. A.*, **11**, 3406. **II. Plastic materials from zirconium dioxide.** OTTO RUFF and JOSEF MOCZALA. *Ibid.*, 193-219, 416.— ZnO_2 is very slightly plastic and ware made from it has walls which are too thick; hence the effort was made to secure greater plasticity. The oxide, 99.65% pure, was heated to 1450° and ground while wet to $0.5\ \mu$. When treated with acids or with salts which give an acid reaction a surprising amt. of plasticity was obtained. After using HNO_3 , the liquid was sepd. by ultrafiltration and it was found that 0.185 milliequivalents of acid had been adsorbed. Nearly the same value was found with other acids. The adsorption is directly proportional to the time of grinding. The plasticity was judged by the behavior of the slip in the molding. It was found that the plasticity of the oxide can be destroyed by washing free of acid and that the plasticity also disappears on standing, but in either case it can be restored by the addn. of acid to activate again the surface of the particles. The theory of the active surface is based upon the formation of a basic salt which unites with acid and ionizes to form the micellion. Measurements of the shrinkage and porosity of the excellent ware made from ZrO_2 are given. The porosity may be reduced by addns. of clay, ThO_2 , etc. **III. Plastic materials from aluminium oxide.** OTTO RUFF and WILHELM GOEBEL. *Ibid.*, 220-9.—Plastic material may be prepd. from Al_2O_3 just as from ZrO_2 and it can be used in prepg. ware for resisting high temps. The materials must be highly dispersed, and the surfaces of the particles must be activated by means of acids. The materials burn without difficulty, giving a clear ring when burned at 1500° or above. Imperviousness is to be secured by using higher burning temps. or foreign oxides such as ZrO_2 . E. C. B. (*C. A.*)

The colloidal nature of clay. A. FODOR and B. SCHOENFELD. *Kolloidchem. Beihefte*, **19**, 1-46(1924).—The clay was ground, sifted, made into a paste with water, acidified with HNO_3 , and allowed to settle. It was then washed by decantation until the supernatant liquid remained turbid. Samples of the soil were shaken up in glass cylinders with water and solns. of electrolytes and the rate of sedimentation observed. NH_4OH in small amts. favors suspension of the clay. In larger amts. it causes aggregation of the particles but not coagulation. Cataphoresis expts. show that even in these high concns. the NH_4OH increases the charge on the particles. NaOH in small amts. favors suspension, slightly higher concn. ppts. the larger particles but not the smaller ones, while still higher concns. ppt. completely. As with NH_4OH , the Brownian movement ceases in solns. contg. much less NaOH than is required to cause coagulation or to remove the charge on the particles. The phenomenon of "reliquefaction" of clay whereby an amt. of NaOH sufficient completely to coagulate a suspension on standing becomes insufficient to prevent its suspension again, is explained on the basis of peptization of the clay by the alkali with resulting increase in sp. surface and therefore in concn. of NaOH required for coagulation. The amt. of NaOH required to coagulate a given suspension depends both on the pH and on the concn. of clay. $\text{Ca}(\text{OH})_2$ coagulates clay suspensions in relatively low concn. The absorption isotherm was found to hold for the adsorption of both NaOH and $\text{Ca}(\text{OH})_2$. On washing out the $\text{Ca}(\text{OH})_2$ from the coagulated clay it did not regain its original adsorptive power for $\text{Ca}(\text{OH})_2$. The coagula produced by alkalis appear swollen while those produced by acids have a "conglomerate" consistency. Small concns. of salts favor suspension; larger ones cause coagulation. If the optimum amt. of alkali for suspension is present, however, salts coagulate more slowly. The phenomenon of protective action is exhibited by humic acids as well as by phosphates. The protective action of phosphates is not a matter of pH. The phosphates are adsorbed by the clay in small amts. F. L. B. (*C. A.*)

Some new standard melting points at high temperatures. H. S. ROBERTS. *Phys. Rev.*, **23**, 386-95(1924).—M. ps. of common inorg. salts, detd. by a crucible method,

using calibrated thermels, are suitable for the calibration of thermels. The flatness of the heating curve is a sensitive test for purity. Detailed suggestions as to technic are given, also a convenient method of using pure metal strips or wires in calibration. Results are as follows: $K_2Cr_2O_7$, $397.5^\circ \pm 0.5^\circ$; $(30.5 NaCl + 69.5 Na_2SO_4)$, $627.0^\circ \pm 0.5^\circ$; KCl , $770.3^\circ \pm 0.5^\circ$; $NaCl$, $800.4^\circ \pm 0.5^\circ$; Na_2SO_4 , $884.7^\circ \pm 0.5^\circ$; K_2SO_4 , inversion $583^\circ \pm 1^\circ$; m. p. $1069.1^\circ \pm 0.5^\circ$; $Ca_2B_2O_6$, $1304^\circ \pm 5^\circ$. B. H. C. (C. A.)

Physico-chemical phenomena in glass making and ceramics. ALBERT GRANGER. *Chaleur et industrie*, 5, 34-7(1924).—An address. A. P.-C. (C. A.)

Influence of certain fluxes on the softening temperature and fluidity of a mono-silicate mixture of lime and silica. W. S. PATTERSON AND P. F. SUMMERS. *Bull. Inst. Mining Met.*, No. 233(1924).—The fuel consumption of a furnace may well be governed by the temp.-viscosity relations of the slags formed. ZnO , MgO and Al_2O_3 require the most superheating and in practice would require a considerable fuel expenditure to render them sufficiently fluid to flow from the furnace. With high percentages of Al_2O_3 the slags are particularly viscous. Although FeO and Fe_2O_3 yield slags which are extremely fluid, their presence in large amts. may raise the sp. gr. to an undesirable extent, and prohibit a satisfactory sepn. of metal from slag. When $2CaO.SiO_2$ is cooled down, the transition from the β - to the γ -form occurs at 675° and is accompanied by a vol. change of nearly 10%, resulting normally in the disintegration of the silicate. During the measurements of the softening temp. of the silicate mixts., this tendency to powder was particularly noticeable with some bases, with others it was suppressed. When 25% of the CaO had been replaced with FeO , Fe_2O_3 , SnO_2 , MgO , or Al_2O_3 , none of the cones disintegrated on cooling, these bases being very active in suppressing the change. ZnO and PbO did not suppress the β - into γ -change up to 75% CaO replacement; but above this amt. none of the cones fell to powder on cooling.

E. F. P. (C. A.)

General

In Russia there has been organized a fourth service arm, the "Dobrokhim," or "chemical volunteers." *London Times*, May 22. H. H. S.

Foundry school established in France. VINCENT DELPORT. *Iron Trade Review*, 74 [15], 992(1924).—The first school established in France for training engineers specially for foundry management was opened in Paris, Jan. 7, 1924. A limited number of students from foundries and engineering schools are chosen by competitive examination for one year course in foundry practise, previous training in math., phys., chem. and drawing being required. T. D. H.

Sawdust as a fuel for gas production. HARROLD DORMAND. *Power*, 59 [22], 862(1924).—The production of gas from sawdust is described; pictures of the gas producer are shown. The disposition of sawdust in some industries presents a difficulty. The burning of sawdust under boilers has not been carried out entirely successfully. The present installation makes gas to run a gas engine at a lumber mill. Apparently gas from sawdust for power purposes is entirely possible with the correct type of producer. C. J. H.

How relative drying time may be approximated. E. B. ATWATER AND R. A. BORLSLAND. *Chem. Met. Eng.*, 29, 226-30(1923).—Drying tests were made on various mats., using a steam-heated pan drier. Samples from the charge were analyzed for moisture at regular intervals until the mat. approached zero moisture. Curves, in which per cent moisture is plotted against time, are given for coal, sawdust, gypsum, fire clay and sand. While the absolute time shown on these curves applies only to the drier used, the relative time required for drying any mat., between two moisture limits, applies to any drier. M. E. M.

Stoneware clays. ALIX CORNILLE. *Rev. Mat. Constr. Trav. Pub.*, **175**, 75-6B (1924).—The following are some French clays which when used alone give good quality stoneware. They are also noted for their wide heat range.

| | Dion (Allier) | St. amant en Puisaye (Nievre) | Rambervilliers Crude | (Vosges) Washed |
|--------------------------------|---------------|-------------------------------------|-------------------------|--------------------|
| Water and Ignition loss | 7.65 | 10.86 | 7.98 | 7.66 |
| SiO ₂ | 62.32 | 64.17 | 65.94 | 48.63 |
| Al ₂ O ₃ | 25.74 | 20.56 | 20.13 | 30.71 |
| Fe ₂ O ₃ | 1.90 | 1.01 | 1.76 | 3.67 |
| TiO ₂ | tr. | 0.82 | tr. | tr. |
| CaO | 0.17 | 0.23 | 0.44 | 0.26 |
| MgO | 0.37 | tr. | 0.77 | 2.24 |
| Alkalies | 2.05 | 2.20 | 3.37 | 6.70 |
| Fusion Range, Cone | 9 | 6-8 | 4-5 | less than 4 |

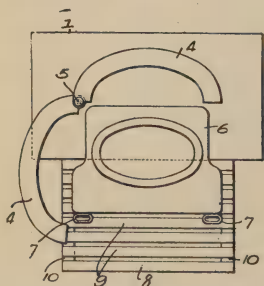
L. N.

Silicate of soda for treatment of concrete roads. ANON. *Nature*, **112**, 953(1923).—Silicate of soda is being more and more used for surface treatment of concrete. Chem. reactions that result from the application of a dilute soln. of silicate of soda to concrete, are very complicated, but seem to include the combination of the silicate with free hydrated lime liberated in the setting of cement to give a lime silicate, which forms a hard compd.: the net result is the formation of an intensely hard outer skin—in which all the pores have been completely filled up—strongly resistant to abrasion and dusting, and largely waterproof. It is essential that the silicate of soda be sprayed over the road in the form of a very dilute soln., viz., 1 of the liquid neutral silicate to 4 of water, while the silicate of soda must be prepd. for the specific purpose, with a fairly high ratio of silicate of soda. As is well known, very many grades are supplied, from a low-ratio product containing 1.60 molecules silica to 1.00 mol. soda (Na₂O) to a very high-ratio grade with over 4.00 mols. silica. The right brand to use is a matter of experience and research, but the results, under proper conditions, are remarkable, and constitute a factor of national importance in the upkeep of roads.

English China Clays, Ltd. ANON. *Oil & Color Trade Jour.*, **65**, 1355(1924).—Eng. China Clays, Ltd., report for 1923 states that the vol. of business was greater, both in home and export markets, than in the preceding year, but the demand for china clay in the world's markets is still below pre-war levels. Until Russia and Central Europe again become effective customers the capacity of china clay companies will continue largely in excess of the world's demands. O. P. R. O.

PATENTS

Apparatus for and process of making saggars. EUGENE A. HULTS AND JOSEPH F. MORANZ. U. S. 1,496,642, June 3. The combination in means for forming saggars and other bodies of green clay, of a molding press; a removable plate on which a sagger is formed; a slatted tray on which the plate, with the sagger, is placed; a stop partly encircling the sagger, said stop having pins engaging the tray so that the plate can be withdrawn to allow the sagger to rest directly on the tray.



Smoke abatement. E. MUMFORD, F. MUMFORD and W. H. MUMFORD. Brit. 210,581, Dec. 8, 1922. A soln. of 1 lb. CaCl₂ in 5 gals. H₂O is sprayed over the fuel on a furnace grate to minimize the evolution of smoke. NaNO₃ or KNO₃ may also be added to the soln. (C. A.)

BOOK REVIEWS

The Silica Refractories of Pennsylvania. E. S. MOORE and F. G. TAYLOR. Pennsylvania Topographic and Geologic Survey, *Bull.* M3, 100 pp., 1924.

A comprehensive report on the silica refractories industry of Pennsylvania. The report includes chapters on the mica-schist quarries of eastern Pennsylvania; the geological formation, character and extent of the various deposits of quartzite; quarrying methods; descriptions of properties and plants of companies quarrying quartzite or making silica brick; the manufacture of silica brick; and chemical and physical properties of the silica minerals and of silica brick.

In 1920 Pennsylvania produced 73% of the quantity and 71% of the total value of silica brick manufactured in the United States. All of Pennsylvania's production, except that from two plants, comes from the formation known as the Tuscarora or Medina quartzite. The two exceptions use the Chickies quartzite (upper Cambrian age) in southeastern Pennsylvania. Certain portions of this formation are mica-schist instead of quartzite. Certain grades of mica-schist are split into slabs and used for refractory purposes.

The Tuscarora formation is Silurian in age and nonfossiliferous except for a peculiar fossil *Arthropycus allegheniensis*. This formation is the greatest mountain-forming rock in central and south-central Pennsylvania and extends from near Williamsport on the northeast to across the Maryland line near Cumberland. A characteristic feature of the formation is the great areas of white broken rock or talus known as ganister floes, varying in thickness from 1 to 35 feet. The most striking floes are near Hollidaysburg, Point View, Water Street, Mt. Union and in Lewistown Narrows. The large floes are much in demand for the manufacture of silica brick. Sixty-five samples of Tuscarora quartzite throughout the state were analyzed, fusion point determined, and results tabulated. The most favorable areas are in Center, Blair, Bedford, Huntingdon, Mifflin, and Juniata counties. In the southern part of the state much of the rock is too soft and crumbles readily.

Companies which quarry quartzite and make silica brick are: Harbison-Walker Refractories Company, Superior Silica Brick Company, Federal Refractories Company, General Refractories Company, United States Refractories Company, Haws Refractories Company, Van Dyke Silica Brick Company, and E. J. Lavino Refractories Company.

J. SPOTTS McDOWELL

Effect of Storage of Cement. DUFF A. ABRAMS. Structural Materials Research Laboratory, Lewis Institute, Chicago. *Bull.* 6 (1924).

Tests were made in order to determine the concrete and mortar-making properties of 3 different lots of Portland cement which had been stored up to 5 yrs. in sacks under different conditions. The cements were purchased from dealers' warehouses and stored in the Testing Laboratory, in the basement of Lewis Institute, and in a shed in the yard for 2 yrs. After 2 yrs. all cements were stored in the Laboratory. In general the cement was stored in lots of 800 to 1200 lbs. in standard cotton sacks; in one group of tests 2 brands of paper sacks were also used; in another group the cloth sacks were covered with thin layers of hydrated lime and Portland cement. Upon receipt of the cement, and after storage for 3 mos., 6 mos., 1, 2 and 5 yrs., concrete and mortar specimens were made for test at ages of 7 and 28 days, 6 mos., and 1 and 2 yrs.

This investigation included compression tests of about 1250 6-by 12-in. concrete cylinders, 1300 2-by 4-in. cylinders of 1:3 standard-sand mortar, and about 500 miscellaneous tests.

The following are the principal conclusions:

(1) There was an appreciable loss in strength of Portland cement due to storage in small lots in sacks for all conditions covered by these tests; the loss was greatest for

the cements stored in the shed, and least for those stored in the laboratory. Basement storage was almost as severe as outdoors. The loss in strength was greater for the first 3 mos. of storage than for later 3-mos. periods. In general the concrete strengths for the cements stored in the shed 1 yr. and longer were about 80% of those for cement stored in the laboratory. The deterioration shown by these tests was probably greater than would be found in a larger lot of cement stored in sacks under similar conditions. (2) The effect of storage of cement was found to be largely a question of the age at which concrete or mortar tests were made. The early tests showed a much greater loss in strength due to storage of cement than tests at later ages. It is of the utmost importance that the strength of the cement was not permanently reduced as shown by the early tests; cements stored in shed for 3 mos. gave an average "strength-ratio" of 73% (as compared to the original strength of concrete) when tested at 7 days, 75% at 28 days, and 84% when tested at 6 mos. to 2 yrs. Similar relations were found for the other conditions of storage. (3) After storage of cement in shed for 3 mos. the average strength-ratio for the ages at which tests were made was 80%; after storage for 6 mos., 75%; 1 yr., 60%; 2 yrs., 46%; and $4\frac{1}{2}$ yrs., 45%. (4) Two brands of paper cement sacks gave results which did not differ materially from cloth sacks when used for storing cement for periods up to $4\frac{1}{2}$ yrs. (5) A thin covering of Portland cement or hydrated lime over cement in cloth sacks showed some advantage, but not sufficient to justify the cost of this method of storage. (6) It appears that the deterioration of cement in storage is due to absorption of atmospheric moisture, which causes a partial hydration which, in turn, exhibits itself in the lower strength-ratios for concrete, particularly at the early ages. D. A. A.

New Book on Practical Pyrometry. Believing that enough thermo-electric pyrometers are in use to warrant a special publication on their installation and care, The Brown Instrument Company, of Philadelphia, has recently published a 72-page book covering this subject thoroughly. It is entitled "Instructions for Installation and Care of Thermo-Electric Pyrometers." There is hardly a man who works with pyrometers who does not at sometime desire information regarding protecting tubes for thermocouples, and various methods of wiring indicators and recorders, methods of eliminating cold junction errors, methods of installing couples, and of checking thermocouples, wiring, or the accuracy of the instruments. These subjects are gone into from the practical and theoretical angles, as well as such other subjects as open, and conduit wiring, mounting the instruments, locating defects in the thermo-electric circuit by various means, and many other points which will be of immense interest to the man who has to work with the equipment from day to day. This book also contains temperature Millivolt Equivalents for thermocouples and conversion of Fahrenheit and Centigrade Scales. It is free to users of pyrometers.

LIESEGANG, RAPHAEL ED.: **Kolloide in der Technik.** Dresden und Leipzig: Theodor Steinkopf. 157 pp. 3.50 M. Chapter XII deals with Colloids in Ceramics. H. H. S.

MULLER, ERICH: **Die elektrometrische Massanalyse.** Dresden und Leipzig: Theodor Steinkopf. (1923) 159 pp. 4.50 M. (The end-point of a titration is observed by change of potential of the solution.) H. H. S.

GIBBS, W. E.: **Clouds and Smokes: The properties of disperse systems in gases and their practical applications.** London: J. & A. Churchill, 1924. xiii, 240 pp. 10 s. 6 d. H. H. S.

Testing (*New Journal*). CHARLES O. REID, Editor. Vol. 1, No. 1 appeared in Jan., 1924. Publ. monthly by the Pullman Publishing Co., Pullman Bldg., New York, N. Y. (C. A.)

CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

Cement, Lime and Plaster

Calcium sulphate cement. C. L. HADDON AND M. A. W. BROWN. *J. Soc. Chem. Ind. Trans.*, **43**, 11T-16T(1924).—The principal objects of research were: (1) To det. the number of allotropic modifications of anhydrous calcium sulphate; (2) To explain differences in setting properties of calcium sulphate from different sources; (3) To exam. the acceleration of setting by other sulphates; (4) To investigate the nature of intercryst. adhesion. (1) Van't Hoff distinguished two forms of anhyd. CaSO_4 , one of which he called "sol. anhydrite." H. and B. conclude that only one modification of CaSO_4 exists; its soly. at 33°C is 2.29 g. per l. and in 5% copper sulphate soln. 2.08 g. per l. (2) The diff. setting rates of diff. plasters are due to particle size and percentage of hemihydrate. Flooring plaster consists of anhyd. CaSO_4 and hemihydrate. Anhyd. CaSO_4 absorbs moisture from the air to form hemihydrate, the speed depending on the particle size. Agglomeration of particles is increased by intensity and duration of heating. Growth of particles is due to the particles adhering and not to finer particles dissolving and repptg. The influence of external conditions is also shown. (3) Rohland's theory that salts which increase the soly. of CaSO_4 increase the setting speed and *vice versa* is shown to be incorrect. Borax, which retards the setting of plaster, increases the soly. of gypsum. CaSO_4 dissolves and ppts. more readily in presence of copper sulphate. (4) Rosenhain enunciated the theory of the existence of a powerful intercryst. cement, amorphorus in nature, and F. C. Thompson put forward an alternative surface-tension theory. The evidence obtained supports R. Setting is caused by the interlocking of needles of pptd. dihydrate, and by crystal adhesion due to amorphous cement which dissolves in certain solvents with corresponding loss of mechanical strength. H. H. S.

Magnesium oxychloride cement. J. H. PATERSON. *J. Soc. Chem. Ind.*, **43**, 215-8(1924).—Sorel's cement is the strongest cement available on a large scale. It can be made nearly twice as strong as Port. cement, and can bind together very large volumes of filling mats., such as sand for concrete or sawdust for floor covering. It consists of the compd. $3\text{MgO} \cdot \text{MgCl}_2 \cdot 10\text{H}_2\text{O}$ mixed with solid solns. of a more basic nature. If the temp. of burning magnesite is carried above 1000°C the resulting MgO will not react with MgCl_2 . Chem. analysis cannot detect overburned MgO in a consignment; thus a mat. of satisfactory chem. compn. may be useless for cement making. MgCl_2 is best used at 22°Bé. ; at 24° it causes the setting cement to expand and destroy the molds or blister the floor. The amt. of MgCl_2 added is only about half of the chloride reqd. to combine with the MgO . Specif. for the cement are suggested, viz: *Tensile strength* 500 lbs. per sq. in. after 7 days and 850 lbs. after 28 days, with a mixt. of 1 pt. MgO , 2 pt. fine ground SiO_2 and 5 pt. standard sand sufficiently wetted with MgCl_2 to be molded into standard briquettes of cement-testing machine type; *Wet strength* should not be less than 30% of dry strength; the briquettes are sprayed with water 3 or 4 times in 8 hrs. and then tested; *Setting time* is detd. with a Vicat needle; the initial set should not take place before 90 min. and the final set should be attained within 8 hrs.; *Expansion* if over 0.3% within 24 hrs. of initial set is questionable. Free lime in the MgO reduces the wet strength. (Ref. is made to Seaton, Hill and Stewart, *Chem. and Met. Eng.*, 1921.) H. H. S.

Magnesium oxychloride cement. H. H. DAINS. *J. Soc. Chem. Ind.*, **43**, 284 (1924).—D. questions Paterson's statement that magnesite is dead-burnt for cement purposes at 1000°C . A temp. of 1500°C would be required. H. H. S.

The Internat. Cement Congress (*Jour. Soc. Chem. Ind.*, **43**, 240(1924)).—Arranged by the Instn. of Structural Engrns. in London, Eng. April 22 and 23, 1924, discussed the following subjects: (1) Cement fondu in practice, (2) surface dust on concrete floors in factories, (3) Cement in sea-water, (4) Cement in concrete roads, (5) Preparations to withstand oil, (6) Influence of size and shape in compression test-

blocks, (7) Microscopy of cement, (8) Porosity of concrete blocks, (9) Use of sea-water in mixing cement.

H. H. S.

Cement and Lime Co. Works—(Queensland). ANON. *Indus. Aust. and Min. Jour.*, **71**, 659(1924).—Situated at Darra, 10 miles from Brisbane. Limestone obtained from quarries at Gore. A full description is given of the works and methods employed. The works now consist of 2 complete units capable of an annual output of approx. 60,000 T. per annum.

O. P. R. O.

Super-cements. RICHARD GRÜN. *Zement*, **13**, 27–30, 39–41(1924).—Three types (1) the quick setting special portland cement, (2) high-calcium cements, and (3) high-alumina or cement fondu are discussed. In (1) only pure raw mats. finely ground and carefully burned, are used. In two days the strength attained surpasses the usual 28-day demands. Tricalcium silicate is probably the chief constituent. Group 2 depends upon the fineness of its raw material particles for its somewhat greater strength. The CaO content lies between 65% and 74%. In (3) calcium aluminates replace the usual silicates. The chief distinction from portland cement lies in the high initial set and the resistance to most salt solns. In some expts. with high-alumina (30%–50%) cements, G. explains the variations due to differences in burning as well as in the compn. The effect of cooling rates and modes is also studied.

H. F. K. (C. A.)

Microscopic examination of raw and calcined gypsum. E. S. LARSEN. *Proc. Am. Soc. Testing Materials*, **23**, I, 236–43(1923).—A microscopic description including form of crystal, *n*, etc., is given for the minerals most commonly found in raw gypsum, viz., gypsum, quartz, anhydrite, calcite, and clay. The changes which occur in these constituents during calcination are discussed and the $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ formed is described microscopically. A method for the estn. of anhydrite is given.

J. C. W. (C. A.)

BOOKS

KLOES, J. A., VAN DER: **Onze Bouwmaterialen**. 3rd ed., 6 volumes. Amsterdam: L. J. Veen. Guilders 50.00. Reviewed in *Arch. Suikerind.*, **32**, 219(1924).

(C. A.)

MENECHINI, DOMENICO: **Chimica applicata ai materiali da costruzione**. Padua: Litotipo-editrice Universitaria. 279 pp. L. 25.

(C. A.)

MÖRSCH, E.: **Teoria e pratica del cemento armato**. 2nd ed. revised. Mailand: U. Hoepli. 691 pp. L. 54.

(C. A.)

PATENTS

Cement. R. DÉCOLLAND. Brit. 211,497, Feb. 14, 1924. Aluminous cements are made in ordinary rotary kilns by (a) lengthening the heating zone, and (b) preventing the formation of a coating due to the fusing of the fuel ashes. The lengthening of the heating zone is accomplished by employing as a fuel a coal such as lignite which contains a large proportion of volatile neutral products, or by diluting the roasting atm. with water-vapor or other neutral gas. The formation of a coating of fused ashes is prevented by mixing with the fuel a sufficient proportion of limestone to combine with the SiO_2 , Fe, etc., and render the ash refractory, or by removing the refractory lining of the kiln at the point of formation of the fused ash, and cooling the plating by external means.

(C. A.)

Slag cements. H. ANDREWS. Brit. 211,517, May 22, 1923. Lime, with or without other substances such as SiO_2 and Fe ore, is mixed with molten blast-furnace slag, and the mixt. is fed into a rotary kiln at 1500°. The waste gases from the kiln are utilized to burn limestone for the production of the lime used in the process. The clinker is ground with or without an addn. of 30–50% of granulated slag.

(C. A.)

Preparing sawdust for use in concrete, etc. E. L. ZUKOSKI. U. S. 1,490,719, April 15. Sawdust is treated with a Na silicate soln. and then washed in order to remove substances such as would interfere with the setting of cement. Cf. C. A. **18**, 158.

(C. A.)

Coated waterproof sheeting. L. KIRSCHBRAUN. U. S. 1,489,254, April 8. A waterproof material adapted for use as a *roofing* is formed of felted fibrous sheets satd. with a bituminous binder and coated on one side with bitumen, fiber and an emulsifying agent, *e. g.*, a mixt. of fiber, asphalt, clay and H_2O . Cf. C. A. 18, 742. (C. A.)

Protecting wooden piling from teredos. C. P. TATRO AND G. DELIUS. U. S. 1,489,798, April 8. Submerged piling is protected from attack by teredos by placing an anode in the water adjacent the pile and passing a current between it and a more distantly placed cathode. (C. A.)

Terminal for electrolytic devices. G. DELIUS AND C. P. TATRO. U. S. 1,489,743, April 8. Structural features of a device for electrolysis of sea water to protect piling. (C. A.)

Road material. G. W. BUTLER AND C. WILLIAMS. Brit. 211,205, Nov. 13, 1922. The special ferro-silicate known as "copper slag" found in the neighborhood of Swansea is intimately mixed with a tarry or bituminous binder to form road macadamizing for paving material. The % compn. of the slag is SiO_2 60.6, Fe_2O_3 33.48, CaO 2.80 MgO 1.00, S 0.54, with traces of Cu and Sn . (C. A.)

Enamel

Japanning license plates. ELMER C. COOK. *Fuels and Fur.*, 2, 695-6(1924).—Describes methods and equipment used in modern plants at state prisons for making motor vehicle license plates. W. E. R.

Unique pickling system—humidity driers cut costs in enameling plant. ANON. *Cer. Ind.*, 3 [1], 22(1924).—(The Columbian Enameling and Stamping Co., Terre Haute, Ind.)—Single coated grayware and triple coated whiteware are produced. Small wooden carts are used to carry the raw mats. from the bins, over the scales to the rotary mixer in 1500-lb. batches. The batches are mixed for 2 mins. and elevated to 12000-lb. storage hoppers. A conveyor bucket carries the mixed raw mats. in 1100-lb. batches to the smelting room. The smelting is done in 2 tilting rotary furs., the combined daily capacity of which is 9 batches of 850 lbs. each, the time required being $2\frac{1}{4}$ hrs. The frit storage bins are calibrated in order to facilitate the taking of inventory. Fourteen 5-ft. ball mills are provided for frit grinding. The frit is ground in 1000-lb. batches until a test shows it has been ground sufficiently, which requires about 10 hrs. The test is made by drawing a 100 cc. sample of enamel, through a one-inch pipe inserted permanently in the mill, mixing it with a given vol. of water and allowing it to settle in a graduate for one min. The ground enamel is unloaded from the mills with the aid of compressed air into zinc lined carts which transfer the enamel into storage tanks in the dipping room. The annealing of the metal which is necessary after two or three draws is done in a continuous furnace at $1500^\circ F$. The completed metal shapes are sent through a continuous scaling furnace at $1300^\circ F$. Dovetailed wooden pickling baskets are used, each having an average capacity of 100 pcs. of ware. Rubber straps and a hand windlass are used for lowering and raising the baskets. The ware is kept in a sulphuric acid bath for 10 mins., rinsed in water and placed in a soda neutralizing bath. The acid tanks are built of 3-inch cypress with pitch-calked joints. The soda and water tanks are built of 2-inch pine with calked joints. A chain drier conveys the carts of pickled ware into the dipping and spraying room. The enamel is fed to the spray guns under a four foot gravity head and atomized with an air pressure of 80 lbs. Individual dipping and spraying booths are used. The triple coated ware is dried in driers at $180^\circ F$ whereas the grayware is dried in the open. Each of the eight driers holds six trucks with a combined capacity of from 1200 to 1500 pcs. of ware. Ware requiring from 2 to 3 hrs. to dry in the open are dried in 15 mins. in the drier. There are twelve coal fired furnaces of the recuperator type equipped with fire-clay muffles

and carborundum hearths. The grayware is fired at 1700°F, the triple ground coat at 1750°F, and the cover coats at 1600°F. An optical pyrometer is used to measure the temp. All furnaces average 15 loads per hr. and operate on a 24 hr. schedule. The furnaces operg. at 1700°F produce 6 tons of ware every 24 hrs. on 3600 to 4000 lbs. of Indiana coal screenings bought at \$2.00 per ton.

P. D. H.

The second annual report of the British Cast Iron Research Association. Pp. 19. Birmingham, Eng.: The Birmingham Printers, Ltd. 1923.

H. H. S.

Glass

New process anneals window glass in ten mins. ANON. *Cer. Ind.*, 3 [1], 17 (1924).—(Interview with Mr. Frank Bastin, Pres., Blackford Window Co., Vincennes, Ind.) This is the first plant built especially for the manuf. of window glass by the Fourcault process. Belgian glass experts have been employed. A plant is maintained for the manuf. of their own refracs. The raw "debiteuse" mixt. is ground in a dry pan to pass 16-mesh, pugged several times and stored in masonry bins. The "debiteuse" are dried for 3 mos. in an open room and fired to 1900°F in 6 days. Modern bins for the storage of raw glass mats. have a combined capacity of 44 cars. The unloading is done mechanically. The raw batch is gathered by an elec. operated car containing a mixing mill and scale. The batch is mixed for 5 mins. and elevated to a 43-ton capacity batch hopper also provided for cullet storage. Fifteen batches of 1500 lbs. each are fed to the furnace daily. The tank proper is composed of 2 tanks built in the shape of the letter "T" and connected by a canal. The dimensions of the melting tank are 21' x 85' by 5 blocks in height. The height of the glass in the drawing tank is 36". The tanks are water and air cooled. The melting tank has a capacity of 800 tons of molten glass. It requires 72 hrs. for the glass to reach the machines. The melting temp. is 2650°F, the temp. in the canal is 2100°F, and the glass is drawn from the feeder tank at 1900°F. The special machines, which are set in a vertical position, may be regulated to draw glass of any thickness from $\frac{1}{16}$ " to $\frac{1}{2}$ " by changing the speed of the asbestos rollers. The sheet is 44" to 52" in width. The glass is annealed in a 20 ft. leer and acquires a beautiful natural polish. Four operators watch each machine, two the drawing and two the annealing process. Two men attend to two machines on the cutting floor. The fuel used is producer gas. The coal is crushed to nut size for the producers and the oversize is used under the boilers in the development of their own elec. power.

P. D. H.

Determination of glass ware temperatures. JAMES VOORHEES. *Fuels and Fur.*, 2, 679-81(1924).—For detg. the av. temp. of pieces of glass ware leaving the mold, or calcg. heat lost by ware between mold and leer, the construction and opern. of a simple calorimeter is described and the calculations involved explained.

W. E. R.

Some notes on pot-clays and the manufacture, use, and treatment of glass-house pots. PERCIVAL MARSON. *Jour. Soc. Glass Tech.*, 8, 29, 45(1924).—The author relates some of his experiences with glass-house pots and pot-clay mixt. The requisite characteristics of a pot clay are outlined and several tests are given. A combination of the treading process and the pugmill process is recommended for tempering. Methods of mfg. pots, arching pots, setting pots, and the prevention of stones in pots are given.

J. G. P.

Specifications for glass. W. E. S. TURNER. *J. Soc. Chem. Ind.*, 43, 92-93(1924).—The charge that glass splinters from food containers is a cause of appendicitis and cancer is, after consultn. with leading pathologists and surgeons, very definitely refuted.

H. H. S.

BOOK

Directory for the British Glass Industry 1923. Soc. of Glass Technology, Sheffield. Price 7S. 6d.—Alphabetical list of glass mfrs., makers of scient. and optical app., crafts-

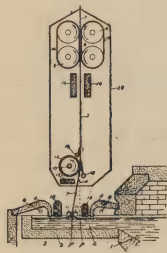
men, firms making plant app. and raw mats., trades unions and other assocns., and periodicals abstracted.

SCHULZ, HANS: *Das Glas*. Kempten: Kosel & Pustet. 180 pp. (C. A.)

ZSCHIMMER, EBERHARD: *Chemiebüchlein des Glasschmelzers. Zum Selbstunterricht*. Jena: Thüringer Verlagsanst. u. Druckerei. 86 pp. (C. A.)

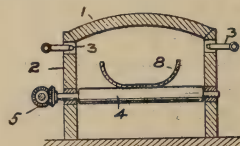
PATENTS

Drawing and flattening sheet glass. CLIFFORD A. ROWLEY. U. S. 1,499,406, July 1. In an app. for drawing and flattening sheet glass, a receptacle containing a mass of molten glass, means for drawing a continuous sheet of glass upwardly therefrom, a deflecting member for the sheet positioned between the molten glass and the drawing means, and having its sheet engaging surface in vertical alignment with the sheet engaging surface of the drawing means, and a pair of coolers one at either side of the sheet source, the cooler at the side beneath the deflecting member having the greater heat absorbing capacity.

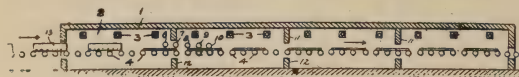


Process of flattening glass sheets.

HARRY G. SLINGLUFF. U. S. 1,497,798, June 17. A process of flattening sheets of glass having polished surfaces and a curvature which it is desired to remove and in which the glass has a temp. below that at which it sets, which consists in moving the sheets continuously ahead in a heated chamber on constantly shifting points of support, exposing the sheets to a temperature such as to cause them to flatten of their own wt. and then exposing the sheets to progressively decreasing temp. to permit them to set as they move along.



Process of flattening glass sheets. HARRY G. SLINGLUFF. U. S. 1,497,799, June 17. The process of flattening a parti-cylindrical sheet of glass which consists in moving the sheet continuously ahead endwise with its convex sides down on constantly shifting points of support, exposing the sheet to a temp. such as to cause it to partially flatten of its own wt. then applying pressure downwardly on the sheet along constantly shifting lines to further flatten it, and exposing the sheet to progressively decreasing temp. to permit it to set as it moves along.



Glass-molding machine. WILLIAM G. BERGMAN. U. S. 1,499,334, July 1. The combination with a glass fur, having a discharge neck of a glass molding mach. having a set of finishing molds on each side of said neck, a single blank mold for each set of finishing molds, means for intermittently reciprocating said blank molds constructed and arranged to cause the blank mold for each of said sets to be reciprocated into alternate engagement with said discharge neck and its respective finishing molds to deliver a charge of molten glass to said finishing molds, means to release said charge from said blank mold as it is moved into engagement with its respective finishing mold, means to move said finishing molds into position to be engaged by said blank molds simultaneously with the movement of said blank molds, means to hold said finishing molds against movement during the stoppage of reciprocation of said blank molds, and means to admit fluid pressure alternately to each set of said finishing molds while said blank molds and finishing molds are stationary.

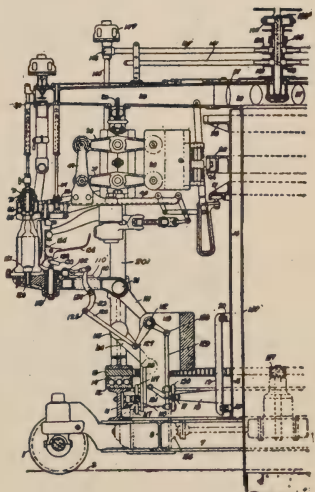
Machine for the manufacture of glass articles. ROBERT FREDERICK HALL. U. S. 1,499,522, July 1. In a mach. for the manuf. of glass articles, the combination of a fixed base, a ring mounted rigidly upon the said base, the said ring forming a lower

member of an anti-friction bearing, another ring rotatable with respect to the first mentioned ring and forming the upper member of the anti-friction bearing, hollow columns mounted upon the second mentioned ring, hollow radial arms in connection with the said hollow columns, such radial arms being also connected to an air supply, mechanisms carrying a parison mold mounted upon the said hollow columns, downwardly extending hollow forks in connection with the hollow radial arms, such forks being provided with apertures to enable cooling air to be supplied to the outside of the molds and parts to be cooled, and means for cutting off the supply of cooling air at appropriate times, substantially as described.

Machine for the manufacture of glass articles. ROBERT FREDERICK HALL. U. S. 1,499,523, July 1. A machine for the manuf. of glass articles comprising a stationary frame, a rotatable frame supported thereon, said rotatable frame including an upper member having a plurality of laterally extending radial arms, and a lower member, a removable vertical column interposed between each radial arm and the lower member and connected therewith, each of said columns having a vertically elongated opening therein, a parison mold supporting frame journaled in means in the elongated opening, a parison mold thereon, a finishing mold carrying frame journaled in the elongated opening, a finishing mold carried thereby, and means for effecting the actuation of the parison and finishing molds, the arrangement being such that when one of the columns is removed, the parison and finishing molds and their associated parts may also be removed independently of the similar parts carried by the other columns.

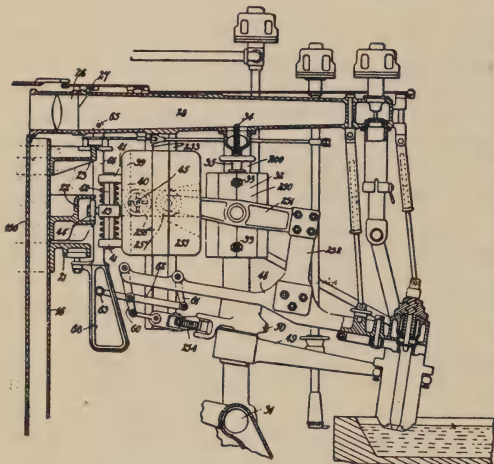
Machine for the manufacture of glass articles. ROBERT FREDERICK HALL. U. S. 1,499,524, July 1. In a rotary mach. for the manuf. of glass articles, the combination of a rotatable framework, rotatable about a fixed central column, a secondary frame adapted to slide vertically with respect to the said framework, in order to adjust the machine for parison molds of different lengths and for different levels of the molten glass, means for so adjusting the said secondary frame and for retaining it in various vertical positions, two levers of the first order, of equal length, one pivoted above the other to the said secondary frame, a link pivotally connected to the outer ends of the said levers, another link pivotally connected to the inner ends of the said levers, so as to constitute a parallel link lever mechanism of the first order, a sectional parison mold carried from the outer link, means operg. upon the inner link for lowering and raising the parison mold at appropriate times, such means being adjustable in order to regulate and accommodate the dipping according to the various adjusted positions of the secondary frame, substantially as described.

Machine for the manufacture of glass articles. ROBERT FREDERICK HALL. U. S. 1,499,525, July 1. In a mach. for the manuf. of glass articles, the combination of a rotatable framework, a lever of the first order pivoted to the said framework, a sectional finishing mold carried by the outer arm of the said lever, a link pivoted to the inner arm of the said lever, another link pivoted to the first mentioned link, parallel to the inner arm of the lever and pivoted to the framework so as to constitute a parallel link lever mechanism, means for raising and lowering the lever at appropriate times, a toothed quadrant pivoted to the outer arm of the lever in proximity to the finishing mold, said toothed quadrant carrying a fork adapted when swung over to embrace the top of the article being



finished, another toothed quadrant meshing with the first mentioned quadrant and also pivoted on the outer arm of the lever, and a rod connecting the latter quadrant to a portion of the framework in such a way that as the finishing mold opens, the said fork engages the top of the article, substantially as described.

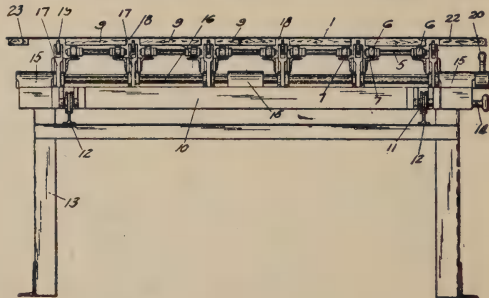
Machine for the manufacture of glass articles. ROBERT FREDERICK HALL. U. S. 1,499,526, July 1, 1924. In a machine for the manuf. of glass articles, the combination



a fixed central column, a framework rotatable about the said central column, a secondary frame adapted to slide vertically with respect to the said framework, in order to adjust the machine for different lengths of parison molds and for different levels of molten glass, means for adjusting the said secondary frame and for retaining it in various vertical positions, a lever of the first order pivoted to the said secondary frame, a sectional parison mold, the sections of which are pivotally carried in fixed relation to the outer arm of the said lever, a counterbalance weight in connection with the inner arm of the said lever, means in connection with the said inner arm of the said lever for lowering and raising the parison mold, link mechanism for opening and closing the

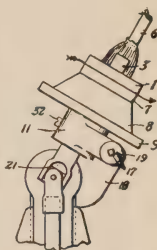
said parison mold, an arm in connection with and adapted to operate the said link mechanism, a depending arm pivoted to the rotatable framework of the machine, a tapering slot at the lower end of the said arm, means on said arm engaging the said tapering slot, a horizontal box cam in connection with the said central column, and a follower to the said cam, connected to the said depending arm, substantially as described.

Cracking-off device for sheet glass. JOHN H. MOLLER. U. S. 1,499,393, July 1. The combination with a table on which sheet glass is supported while being scored, of a cracking-off device movable to different positions beneath the table and sheet to elevate the sheet at the score line. The combination with a moving table or conveyor on which the glass sheet is carried while being scored, of a cracking-off device movable to position beneath the score line and comprising means to elevate the sheet.

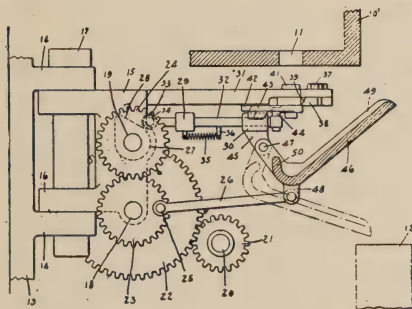


Process for the treatment of silicate compositions. ROBERT L. FRINK. U. S. 1,497,263, June 10. The process of producing a mixed silicate suitable for use in glass manuf. which consists in subjecting a silicate and an alk. metal chloride to the action of heat and a decomposing gas, and treating the resulting reaction mixt. with an active alkaline earth contg. reagent in controlled amounts to partially decompose the same.

Glassworking mechanism. NOBLE W. HARTMAN. U. S. 1,497,332, June 10. The combination with a blow-pipe and a carrying mechanism therefor, of a marvering device comprising a pair of juxtaposed members forming therebetween an aperture of predetd. shape, at least one of said parts being loosely mounted and adapted to be driven by the charge of glass on said blow-pipe during its passage through the said aperture and to roll the said charge of glass into a shape similar to that of the said aperture.



Glass flowing and shearing device. EDWARD MILLER. U. S. 1,497,929, June 17. In a glass flowing and shearing device, the combination with a glass discharging spout, and a glass receiving mold, of shearing means positioned beneath said spout, said shearing means comprising a pair of shearing members, yielding means normally maintaining said shearing members in the open position to permit said glass discharging spout to discharge glass through the same, means for closing said shearing means in opposition to said yielding means for severing the glass passing through said shears, a pivotally supported spoon positioned beneath said shearing means and adapted to receive the severed glass therefrom, means for tilting said spoon to deposit the severed glass into the mold, and means for simultaneously actuating said shearing means and said spoon tilting means in timed relation.



severed glass therefrom, means for tilting said spoon to deposit the severed glass into the mold, and means for simultaneously actuating said shearing means and said spoon tilting means in timed relation.

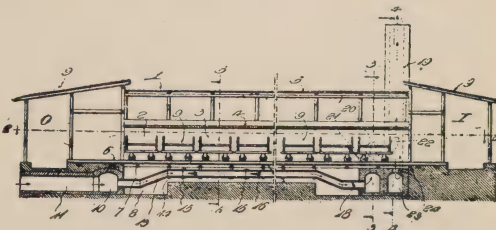
Heavy Clay Products

Bricks from ground clinker. ANON. *South Africa Jour. of Industries*, 6, 433(1923).—Ground clinker, mixed with $\frac{1}{9}$ of its wt. of cement, is being used for making bricks at the municipal gasworks at Würzburg, Germany. By this method, 8 cu. yds. of good building mat. are produced from $\frac{1}{2}$ cu. yd. of cement, with an energy-consumption equivalent to about 13 lb. of coal, and are produced at half the cost of ordinary bricks.

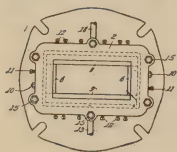
O. P. R. O.

PATENTS

Clay-products drier. ROBERT THOMPSON KYLE. U. S. 1,499,227, June 24. A drier comprising a plurality of tunnels having ware inlets at one end and ware outlets at their other ends, a cross flue under the outlet ends of said tunnels, and a hot air inlet for said cross flue, a second cross flue under the inlet ends of said tunnels, a plurality of heating pipes extending from the first to the second named flue, the space around said pipes being in open communication with said tunnels, a third cross flue adjacent said second flue, the crown of said third flue having openings communicating with the inlet ends of said tunnels, a stack rising from and communicating with said third cross flue, and a fan for drawing air from said second flue and forcing it into said stack.



Die for brick machines. LLOYD W. BROWN. U. S. 1,497,669, June 24. An extrusion die for brick machines, comprising, in combination with a substantially rectangular hollow head, a plurality of complementary die members forming each the top, bottom and sides of the die, the members composing each the top and bottom of the die having their ends overlapping the ends of the members of said sides, and means for adjusting the positions of each of the members of the sides with respect to the adjacent walls of said head.



Refractories

Note on the influence of rapid cooling on the reversible expansion of fireclay. H. S. HOULDSWORTH. *Jour. Soc. Glass Tech.*, 7, 29, 30(1924).—Test pieces of Farnley fire clay were fired to cones 9 and 14–16, held at these respective temps. for 2 hrs., and pieces from each burn were subject to different cooling rates. The methods of cooling included: plunging in cold water, cooling in air, and allowing them to cool slowly in a fur. for 17 hrs. The reversible thermal expansions of the specimens were then determined. In the case of the pieces fired to cone 9 very little difference was noted in the expansions of the pieces cooled at varying rates. In the case of the pieces fired to cone 14, the reversible thermal expansion of the test pieces cooled rapidly differed considerably from that of the slowly cooled specimen. The latter showed a more rapid rate of expansion from 100–200°C, and from 550–600 than in the other temp. ranges examined, due presumably to the volume changes associated with the alpha-beta cristobalite (or tridymite) and quartz changes, respectively. The rapidly chilled specimens were then reheated in a muffle for 6 hrs. at 950°C and their reversible thermal expansions determined after cooling. This treatment did not affect the thermal expansions of the specimens. The slowly cooled and rapidly cooled clays on being reheated to cone 12 for 2 hrs. and allowed to cool slowly in a fur. showed considerable change in their expansion-temp. curves. The expansion from 100–200 was now considerably greater than was that previously obtained for the slowly cooled test pieces, while the expansion at 570 due to the alpha-beta quartz inversion was reduced somewhat. The effect on cold crushing strength of varying rates of cooling was detd. It was found that the cold crushing strength was reduced by nearly 30% as a result of rapid cooling, although the actual cold crushing strength is still considerable. J. G. P.

Madagascar graphite. A. D. LUMB. *Bull. Imp. Inst.*, 20, 61–68(1922).—Production of graphite in Madagascar began in 1907 with an output of 8 T. and increased to 35,000 T. in 1917, but has since fallen off considerably owing to post-war depression. It is of the flake variety and occurs in schists and gneisses in the older cryst. rocks, which extend over two-thirds of the island. About 60% is considered of crucible grade. The mines are worked entirely by natives with European supervision for the larger enterprises. The sepn. of the pure graphite from the gangue is a rather difficult matter principally owing to the presence of mica, which is of nearly the same sp. gr. as graphite and occurs in the same flaky form. In the early stages of the industry the method of treatment was very primitive, the process consisting in washing the mat. in a wooden trough, drying in the sun, panning, and sifting in a hand-sieve. Recent practice makes use either of a dry method, or a wet method, or a combination of the two, and a final concentration by oil flotation. This last treatment ensures a satisfactory separation of the mica and silica from the refined product. The Ceylon and Madagascar deposits are the most important in the world. Although the Ceylon is slightly superior in grade, the Madagascar can be mined much more cheaply and so can be sold at a much lower price. O. P. R. O.

Refractories for coke ovens. W. J. REES. *Coll. Guardian*, 119, 378(1920).—As a

preliminary to the discussion of properties desirable in bricks for coke ovens, Rees states the general conditions of their use: (1) *Temp.*—The temps. which bricks have to stand are not, in comparison with those met with in other industrial operations, high. In the heating flues the max. temp. under ordinary conditions of coking is not likely to exceed 1350°C. (2) *Load.*—The load is not sufficient to lower the refractoriness of any of the bricks in general use. (Brief reference is made to effect of load on the refractoriness of fire-clay and silica bricks.) (3) *Permeability of Gases.*—The bricks must become fairly gas-tight, and the cement used must also at the temperature of coking produce gas-tight joints. (4) *Resistance to abrasion.*—The bricks must be mechanically strong enough at coking temp. to resist the abrasion of the insertion and withdrawal of the charge and also the abrading action of the hot gases. (5) *Resistance to corrosion.*—This is perhaps the most important factor with which it is necessary to deal; compn. and amt. of impurities present in the coal which are likely to act as corrodants. (Mr. Rees' full report of this appears in *Coll. Guar.*, **117**, 1278(1919).) Taking the Tinsley Park figs., there will be carried into the oven, with each charge of slack and adhering water, approx. 50 lb. of sodium chloride and 20 lb. of sodium sulphate. The salt present will begin to volatilize at 800°C, and in addition to this removal of salt by volatilization, there will be some removed by hydrolysis as steam from the center of the charge comes in contact with the hot coal. In the coke oven the salt vapor, instead of reacting with the surface of the bricks, will penetrate them: there may be some deposition of salt inside the brick, and some of the vapor may pass on to it until it reaches a zone in the brick at which the temp. is high enough for interaction to take place with some rapidity. The joint result of the slower interaction in the cooler portion of the brick and the more rapid action in the hotter zones, will be the formation of a weak spongy mass, which is becoming increasingly more open to the attack of the salt, and which may fall away, or be dragged away, by the moving coal or coke. Another impt. phenomenon in connection with this corrosion, to which attention has been previously drawn by Fearnside is the very general presence of a layer of hematite in that portion of the brick where disintegration and shearing of the brick are taking place. This is probably due to the formation and volatilization of ferric chloride by the action of the salt vapor on iron oxide, present either in the coal or more probably in the bricks. This vapor will penetrate the porous bricks until it reaches a zone in the brick to which oxygen, containing gases from the combustion flues, penetrate, and it will then be decomposed with the formation of hematite which will be deposited. Besides the disruption due simply to chem. attack, disruption may take place due to the fact that the corroded part will have a different coeff. of expansion to the remainder of the brick, and with the repeated heating and cooling of the oven wall, the differential expansion and contraction may cause a falling away of the corroded portion of the brick. An example of the corrosive action of salt came under the writer's notice in connection with expts. on the effect of heat on mixt. contg. salt, limestone and sand. At temps. of 1350° to 1400°C, the clay lining of the contg. vessel was very rapidly corroded. The clay was replaced by a silica lining, and the corrosion was very considerably reduced. The exptl. evidence indicates that salt corrosion is likely to be much more severe on fire-clay bricks than on either alumina or silica bricks. American practice has been largely in the direction of the use of silica bricks; there are, perhaps, factors in connection with the size, construction and general coking practice which have minimized the difficulties of their use. In making silica bricks it is necessary to add to the crushed silica rock some mat. which will, at high temperature, act as a bond; the mat. almost invariably used is lime. This addn. of lime reduces the refractoriness of the silica, and the propn. which can be used, depends on the size of the fragments of quartz, and on the impurities present in the silica rock. The size and grading of the fragments of silica for coke oven bricks, and the compn. of the matrix are of paramount importance. Le Chatelier, in France, carried on exptl.

work, which definitely indicated that by substituting for ordinary fine material used in making brick, an impalpable powder obtained by grinding the raw silica rock in a tube-mill, a brick of distinctly superior physical properties could be produced. Test bricks were made, which were burned at approx. 1500°C, and the foll. results were obtained from them in standard tests:

| Compn. of mixt. | Linear expansion per c. | Density | | Crushing strength in kilogs. per sq. cm. | | |
|-------------------------|----------------------------|----------|------|--|-------|--------------|
| | | Apparent | Real | Cold | | At 1600°C |
| | | | | Dried | Burnt | |
| 75 crude quartzite | 5.2 | 1.63 | 2.35 | 15 | 165 | 30 |
| 25 impalpable quartzite | | | | | | |
| 2 lime | | | | | | |
| 75 crude quartzite | | | | | | |
| 25 fine quartzite | ... | .... | 2.33 | 10 | 60 | 8 |
| 2 lime | | | | | | |
| 25 crude quartzite | | | | | | |
| 75 impalpable quartzite | 3.9 | 1.36 | 2.35 | 9 | 135 | 10 |
| 2 lime | | | | | | |
| 25 crude quartzite | | | | | | |
| 75 impalpable quartzite | ... | .... | 2.33 | 6 | 52 | 3 |
| 2 lime | | | | | | |

The superiority of the brick contg. 25% of the impalpable quartzite powder is very apparent. This exptl. work has been amplified in this country (England), and it has been proved on the large scale that by using a silica rock which, on crushing, gives angular fragments, by suitably grading these crushed fragments and by mixing them with a definite propn. of impalpable silica powder (with which a bonding mat. has been mixed) bricks can be made which have a very satisfactory texture, and in which the after-expansion during use is small. The foll. is an anal. of a silica brick which has a satisfactory phys. constitution, but it is obvious from the foregoing that, within limits the texture and mineralogical constitution of the brick are of more importance than its chem. compn.:

| | Per cent | | Per cent |
|--------------------------------|----------|-------------------|----------|
| SiO ₂ | 95.16 | MgO | 0.15 |
| Al ₂ O ₃ | 1.29 | K ₂ O | 0.51 |
| Fe ₂ O ₃ | 0.78 | Na ₂ O | 0.24 |
| TiO ₂ | 0.15 | Total | 100.16 |
| CaO | 1.88 | | |

The condy. from heat of the refractory mat. used for the coke oven is a factor which needs some consideration. Measurements and experience in American coke oven practice indicate that at coking temps., the condy. of a good silica brick is decidedly greater than that of a fire clay or semi-silica brick, which should be another point in favor of the use of silica brick in coke oven construction. (This paper was given before the Midland Section of the Coke Oven Managers' Assn., with further discussion, page 454, *Coll. Guardian*.)

O. P. R. O.

Refractory materials. J. W. MELLOR. *Coll. Guardian*, 117, 479, 537, 719, 775 (1919).—Synopsis of a series of lectures given by Dr. Mellor before the Soc. of Chem. Indus. dealing with the development and problems peculiar to the refrac. mats. problem.

O. P. R. O.

Fire clay and silica brick as gas-house refractories. A. F. GREAVES-WALKER. *Gas Age-Record*, **53**, 567-70(1924).—U. S. resources of refractory fire clays are given; Georgia surpasses all other states in quantity of reserves. Mfg. methods for fire-clay brick are outlined. Requirements for gas house refractories are listed and most salient features pointed out. The characteristics of silica brick are listed and discussed from the viewpoint of gas-house refractories. H. G. B. (C. A.)

Tests on clays for making zinc retorts. K. ENDELL AND W. STEGER. *Metall. u. Erz*, **20**, 321-31(1923).—Tests on a no. of German, Belgian, and American clays have been carried out to det. their suitability for making zinc retorts. Detns. were made of the chem. and rational compn., the shrinkage on drying and the softening point of the raw clay, the linear shrinkage and porosity of the clay after firing to 1000°, 1100°, 1200°, 1300°, and 1450°, and the softening point of a mixt. of equal parts of grog and clay under load at high temps. The plastic ball clays tested contained over 95% of clay substance and the lean clays between 50 and 75%, but the plasticity and shrinkage on drying were not propl. to the amt. of clay substance present. The ball clays, with the exception of the Amer., attained their max. and linear contraction at 1100°, while the leaner clays continued to shrink slowly with further rise of temp. The fusion point lay between cones 28 and 34 (1630-1750°) and was independent of the content of clay substance. The softening point of mixts. of clay and grog under load was higher the higher the SiO₂ content of the grog. Six retort mixts. after firing at 1000° showed values for the tensile strength between 9 and 66 kg. per sq. cm., the latter being found in the Amer. mixt. owing to its high content of Fe₂O₃ (3.88%) and TiO₂ (1.48%). The shrinkage on firing, porosity, and fusion point of all the mixts. were practically the same, but the German (Silesian) mixt. softened under load about 100° below the others. Clay mixts. contg. 60% to 80% of SiC softened about 100° higher than the grog mixts., but had the same porosity. J. S. C. I. (C. A.)

Determination of thermal conductivity of refractories. M. D. HERSEY AND E. W. BUTZLER. *J. Wash. Acad. Sci.*, **14**, 147-51(1924).—See C. A., **18**, 889.

C. H. K. (C. A.)

Some Italian magnesite deposits. G. CASTELLI. *Rass. min. met. chim.*, **60**, 5-8 (1924).—Several MgCO₃ deposits of special value are described stratigraphically. *Castiglioneello*. The product, which is hard and white, analyzed in %: MgCO₃ 88.72, SiO₂ 3.40, Fe₂O₃ 1.80, CaO 3.15, MgO 42.45, H₂O and loss of ignition 49.20%. Large amts. valuable in metallurgy and for the prepn. of Mg salts are available. *Monterufoli*. Because of impurities the material is useful only after special sorting. Av. compn.: MgCO₃ 86.02, CaCO₃ 9.60, Fe₂O₃ + Al₂O₃ 2.71, insol. in HCl 1.67%. *Island of Elba*. Av. compn.: MgCO₃ 84.50, CaCO₃ 1.00, SiO₂ 11.00, Al₂O₃ 0.50, Fe₂O₃ 0.90, H₂O 2.10%. *Querceto*. These are the most important deposits in Italy. The best material has the av. compn.: MgCO₃ 97.19, CaCO₃ 0.93, SiO₂ 1.12, Fe₂O₃ 0.63, Al₂O₃ 0.13%, and is used for chem. products. A second grade, contg. 96.06% MgCO₃, is used for cement; and a third grade contg. 95.85% MgCO₃ for refractory basic brick for furnaces.

C. C. D. (C. A.)

Whiteware

Five thousand pieces of sanitary ware a week. ANON. *Cer. Ind.*, **3**[1], 39(1924).—(The Thos. Maddock's Sons Co., Trenton, N. J.) Domestic and imported raw mats. are used. French amorphous flint pebbles are imported and calcined in a small up-draft wood fired kiln having a capacity of 18 tons of pebbles. The kiln is filled with wood and pebbles in alternate layers. The calcined pebbles are crushed in a chaser mill and dry ball milled to pass 200-mesh. Batch cars are used in weighing up the batches which are blunged in two five-ton blungers for 2 hrs. The slip is discharged into the raw agitator from which it is pumped over a double lawn of 100- and 120-mesh

respectively. After passing over the magnetic separators, the slip passes into two finished raw slip agitators from which it is pumped to the four filter presses at 110 lbs. pressure, 32 mins. being required to fill each press. The 4 presses are emptied and refilled in $1\frac{1}{2}$ hrs. After being filter pressed the clay body is either sent to the pug mills to be pugged for use in making ware by the pressing process or sent to mixing tubs to be made into casting slip. The four mixing tubs each have a capacity of 5000 lbs. of casting slip. Thirty-five tons of casting slip are prepd. daily. The salts are added in the mixing tubs. The slip is kept in storage agitators from which it is pumped to the casting rooms. A slip wt. of 32 ozs. to the pint is maintained. A total of 5000 pcs. of ware a week is produced by 91 casters and 53 pressers. Two hrs. are required to cast a piece and two casts per day are made with the same mold. The ware is dried on steam heated open floors for 10 days after which it is finished and carried on an overhead conveyor to the green room and kept at a temp. of 80°F until ready for the kiln. Grog ground to from 10- to 30-mesh constitutes 50% of the sagger body mix. The batch is aged 6 days before being pugged. A gang of 3 men make 250 stand. sagers per day on one mach. About 40 larger hand made sagers are made per man per day. The sagers average 8 fires. An elec. driven movable vertical pug mill is mounted on a track with three soaking pits for sagger batches on either side. There are 21 down draft coal fired periodic kilns each having a capacity of 400 pcs. of ware. The ware is bisque fired in sagers to cone 9 in 30 hrs. The temp. is measured with pyrometric cones. A fritted transparent lead glaze is used. The frit is fired in sagers in the bisque kiln, ground in a chaser mill and ball milled 18 hrs. with the other glaze ingredients. The glaze is sieved through a 130-mesh silk lawn and passed over a magnetic separator. The ware is dipped one day and placed in the kilns the next. The glaze firing is done at cone 8 in 30 hrs. A bonus system is very instrumental in reducing the labor turnover and increasing the quality and output of the ware. P. D. H.

Some facts about ball clays. FRED S. BELL. *Cer. Ind.*, 3 [1], 27(1924).—Clays should be produced in stand. selections and not mixed at the mines. Clays from different strata but from the same deposit when fired to cone 7 vary from 0 to 9% absorption, whereas the color varies from buff, through grayish white to white. The producer should know the charact. of each stratum of clay and be reasonably familiar with the requirements of each line of ceram. product in which the clay is used. The most satisfactory way for testing ball clays is to substitute the clays in question in actual body mixts. and fire samples in different parts of the kiln in order to obtain the max. variation in temp. treatment. Inasmuch as it is difficult to obtain uniform sagger clay, the use of a certain amount of stand. ball clay is justified and thus permits the use of more tender refrac. clays. The overfiring temp. of a refrac. clay is quite as important to know as the fusion temp. A graph is shown illustrating the increase in strength of blunged clays over clays that are soaked down. Weathering is beneficial only when the entire mass of clay is kept soaked with water. P. D. H.

The properties of technical porcelains of the Royal Berlin Porcelain Factory. R. RIEKE. *Z. angew. Chem.*, 37, 190(1924); cf. *C. A.*, 18, 157.—Detns. made during the last few yrs. may be summarized as follows, comparing Royal Berlin (a) with 7 other technical porcelains (b). Tensile strength (a) 320, (b) 161–265 kg. sq. cm.; ball-test compressive strength (a) 1376, (b) 674–1384 kg.; transverse strength (a) 855, (b) 588–777 kg. sq. cm.; impact transverse strength (a) 1.99, (b) 1.75–1.95 cm. kg. sq. cm. Ball-test compressive strength was detd. on plates 10 cm. in diam. and 1 cm. thick, between 2 steel balls of 31.7 mm. diam. Transverse strength was detd. on cylindrical pieces 16 mm. in diam. and 120 mm. long. Impact strength was detd. on a pendulum type of app. built by Schopper in Leipzig, the test pieces being 16 mm. in diam. and 12 cm. long. Soly. and appearance under the microscope are briefly discussed. C. H. K. (*C. A.*)

PATENTS

Machine for making crucibles. WILLIAM G. MOLAND. U. S. 1,497,190, June 10. In a machine for forming crucibles and the like having a bilged shape, the combination of a separable mold of fixed circumferential dimensions, a collapsible bilge shaped core mechanically associated therewith, and means for forcing a measured quantity of material into the space between the core and the mold and for thereafter compressing the same within said space to thereby form the crucible.

Machine for forming earthenware tanks. WILLIAM G. MOLAND. U. S. 1,497,191, June 10. In a machine for forming earthenware tanks, a mold, a plunger head slidably mounted therein, controllable means for applying pressure to said plunger head, a core member adapted to be supported within the mold, said core member being of such shape and dimensions with respect to the mold as to provide a space between said core member and said mold in which the tank is formed, and means for holding said core member in fixed relationship with respect to the tank during the forming operation and for thereafter withdrawing the core with respect to the mold.

Equipment and Apparatus

Practical dissertation on pebble mills. EDWARD W. LAWLOR. *Cer. Ind.*, 2 [6], 369-70(1924).—In order to eliminate iron contamination from man hole covers on ball mills, it is suggested to line the cover with a block of rubber instead of silex. This would also insure a tight fit. It costs, in material and labor, about \$300 to line a 6' x 8' mill with silex. The inside diameter of the mill is reduced 6". The mill is out of operation about one week. The surplus lime-carrying cement must be removed by running a while after relining. A $\frac{5}{8}$ " rubber lining (*India Rubber World*, Aug. 1, 1923, and Nov. 1, 1923) has been run in an ore mill loaded with iron balls for 9 mos. and was still in good condition, whereas a silex lining would have worn out in 6 to 8 mos. After 3 mos. service running 24 hrs. per day and after having ground at least 1000 T. of ore, no signs of wear were apparent. It would take 2 men 5 hrs. to replace an entire rubber lining. The rubber is made in man hole size strips. Rubber lining increases the capacity of the mill and reduces the cost of grinding. Any small particles of rubber passing through the sieve would be readily burned out of the ware. Irregular shaped pebbles grind better than round ones as the voids are reduced. The mill should be half full of pebbles and the charge about 23% of the total cubic capacity or 1 cu. ft. of pebbles to $\frac{1}{2}$ cu. ft. of mat.

P. D. H.

Heat transfer in furnaces as caused by radiation of gases. ANON. *Fuels and Fur.*, 2, 675-8(1924).—A presentation and discussion of mat. from *Bull.* No. 55 of the Heat Economy Bureau of the German Iron and Steel Institute (Alfred Schack), deals with heat transfer by radiation from clear gases. Diatomic gases radiate and absorb but an infinitesimal amt. of heat, while the spectra of CO_2 and H_2O vapor (both triatomic) show broad absorption (and radiation) bands, most of which lie in the infra red, or invisible portion of the spectrum. *I. e.*, products of combustion contg. CO_2 and H_2O vapor can radiate considerable quantities of heat, although they are practically non-luminous, and scarcely visible. Equations and curves are presented and tables of computations given for radiation in cal. per sq. m. per hr. of infinitely thick layers of CO_2 and H_2O vapor at different temperatures. If the gases are flame filled, incandescent particles of C float in the gas stream and increase the radiation. It is shown that low velocities of flow, and time for the gases to radiate their heat are needed at high temps., while at lower temperatures high velocities of flow are desirable, in order to increase the heat transfer by convection. A stagnant layer of products of combustion in the roof is useful because the gases absorb ht. and protect the roof from too intense a radiation.

W. E. R.

Kilns, Furnaces, Fuels and Combustion

Lighting oil and gas burners. M. H. MAWHINNEY. *Fuels and Fur.*, **2**, 687-91 (1924).—Practical pointers on the lighting of cold fur. W. E. R.

Combustion devices for liquid fuel. W. TRINKS. *Fuels and Fur.*, **2**, 21-4, 135-8, 255-8, 349-52(1924).—Describes oil burners under classification of 3 types: Vaporization, atomization and a combination of vaporization and atomization. Indus. application is limited chiefly to atomizing burners. The paper discusses methods for obtaining proper mixt. of atomized liquid fuel and air in furnaces, with conclusions summarized in tabular form:

| Method of atomization | Velocity of oil ft./sec. | Velocity of atomizing air ft./sec. | Lbs. of atomizing air per lb. of oil | Weight of momentum of oil and atomizing air | Weight of air to be induced | Velocity of resulting mixture | Pressure against which air can be induced inches of water |
|---|--------------------------|------------------------------------|--------------------------------------|---|-----------------------------|-------------------------------|---|
| Mechanical oil | | | | | | | |
| 150 lbs. per sq. in..... | 165 | 0 | 0 | 166 | 14 | 11 | 0 |
| High press. air atomization | | | | | | | |
| 100 lbs./sq. in. ... | ... | 1600 | 1.12 | 1792 | 12.88 | 120 | 1.00 ¹ |
| Low press. air atomization | | | | | | | |
| 2 lbs./sq. in. ... | ... | 490 | 4.62 | 2270 | 9.38 | 151 | 1.70 |
| Fan blast atomization. Air at 4 oz. pressure..... | ... | 139 | 9.50 | 1320 | 4.50 | 88 | 0.11 |

¹ The high pressure burner can induce against a higher pressure if more than the minimum quantity of air necessary for atomization is used. W. E. R.

Industrial heating furnaces. E. F. COLLINS. *Chem. Met. Eng.*, **30**, 936-41 (1924).—Lists the characteristics of elec. heat, and the different types of fur. with especial emphasis on the metallic resistor type. Photographs are given of different installations, with some performance records. M. E. M.

Metallic resistor furnaces. E. F. COLLINS. *Chem. Met. Eng.*, **30**, 981-5(1924).—Discusses the laws, chem., phys., and economic, governing the use of this equipment. M. E. M.

Electric furnace developments. FRANK HODSON. *Iron Coal Trades Rev.*, **108**, 596(1924).—A review. J. F. B. (C. A.)

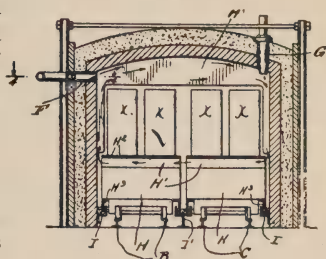
The electric furnace in the porcelain industry. ARTURO PAOLONI. *J. four elec.*, **33**, 70(1924).—This is a resistor furnace which can be readily maintained at the prescribed temp. (1400-1500°) for a porcelain kiln. The resistor material consists of artificial graphite (99% C). The heat reflecting walls are constructed of recrystd. carborundum. Two types of furnaces have been tried out, an intermittent type with a single chamber, and a "continuous" or tunnel type with 12 chambers in series. C. G. F. (C. A.)

BOOK

TRINKS, W.: **Industrial Furnaces.** Vol. I. New York: John Wiley & Sons. 319 pp. 22s. 6d. (C. A.)

PATENT

Twin-tunnel kiln and method of operating the same. CONRAD DRESSLER. U. S. 1,499,354, July 1. The method of regulating the rate of heat transfer from the hotter ware to the colder ware in the end portion of a twin tunnel kiln, which consists in setting up a forced circulation of the kiln atmosphere in said portion of the kiln along paths looped about the kiln axis.



Geology

Pottery clay (Australia). ANON. *Bull. Imp. Inst.*, 21, 321(1923).—White clay from Bendigo, Victoria, was tested by the Imp. Inst. 1921, on its suitability for the manuf. of porcelain and refrac.

bricks: the results indicated that the clay, after washing to remove gritty matter, was suitable for the manuf. of white permeable pottery, which could be glazed to yield a fine white earthenware, and could also be used in admixt. with "grog" for production of second-grade refrac. brick. In 1922 further trials were carried out, in conjunction with felspathic and siliceous materials available for the purpose. This clay was grayish in color, plastic and practically free from grit, and superior to material examined in 1921. From the considerable differences in the compn. of this clay and previous samples, it is probable that the clay varies in different parts of the deposit. While results of these tests showed the clay to be quite suitable for manuf. of stoneware or semi-porcelain, large scale trials would be advisable to det. the working properties of the clay under indus. conditions. Mfg. operations would necessitate careful chem. control. O. P. R. O.

Bauxite (Gold coast). ANON. *Geol. Surv. Rept. of Gold Coast, 1921*.—Further discoveries of bauxite deposits have been made in the Colony. The ore varies in quality, some of high grade while much is highly ferriferous. An interesting feature of these bauxite deposits is that in some cases they carry both gold and silver in appreciable quantities. It is suggested in the Rept. that the gold and silver might be worth recovery from the insol. residues which would result from the treatment of the bauxite by the Bayre process. O. P. R. O.

Bauxite (India). K. P. SINOR. *Bull.* 3 (1923) (Geol. Dept. of Rewa Ste).—Bauxite of high grade is found in large quantities on the Amarkantak plateau, and in the hills north of Nerbudda River. Sinor describes these deposits with special reference to the possibilities of establishing an aluminium-producing industry in the State. Picked specimens of this bauxite contained from 62 to 66% of alumina, the general quality ranging from 51 to 57%. Bauxite of lower grade occurs in large quantities at many places in the Ste. O. P. R. O.

Mineral pigments (Australia). ANON. *Bull. Imp. Inst.*, 20, 244(1922).—Valuable deposits of oxides and ochers have been found, principally in the neighborhood of Cape Flattery. Samples of quartz sand-washed from these pigment deposits in the course of refining have been investigated at the Imp. Inst., and found to be suitable for the manuf. of glass, for such purposes as the production of pale-tinted bottles. (*Chem. Trade Jour.*, 694(1921).) O. P. R. O.

Fluorspar deposits of Kentucky. LOUIS W. CURRIER. *Ky. Geol. Surv.*, 13, 6(1923).—Describes the origin, occurrence, association, mining, milling and uses of Kentucky fluorspar. C. E. B.

Chemistry and Physics

Borax from colemanite. BURTON G. WOOD. *Chem. Met. Eng.*, 30, 976-8(1924).—The process by which borax is obtained from colemanite is described in detail. M. E. M.

Viscosity. The British Engineering Standards Association (28 Victoria St., London, S. W. 1) has issued Publication No. 188—1923 "British Standard Method for Determination of Viscosity in Absolute Units."

H. H. S.

BOOK

FREUNDLICH, DR. HERBERT: **Kapillarchemie: Eine Darstellung der Chemie der Kolloide und Verwandter Gebete.** Third edition pp. xvi — 1225. Leipzig: Akademische Verlags-ges., 1923.—Deals with colloid chem. in relation to surface tension, adsorption, electrical surface effects, kinetics of new phases, Brownian movement, sols (lyophobic and lyophile), gels, clouds, smokes, and systems in which the continuous phase is solid.

H. H. S.

Preparation of alumina from metallic nitrates. ANON. *Oil and Color Trade Jour.*, 65, 1744(1924); (Ger. 339,983, Goldschmidt, Christiania).—Aluminium and other nitrates are partially decomposed by ht., so as to form a mixt. of hydrated alumina and undecomposed nitrates of the other metals, the latter being removed by lixiviation. The nitrous fumes evolved are converted into nitric acid, which is utilized for the dissociation of fresh quantities of the raw materials. The recovered nitrates of lime, potash, soda, etc., can be worked up into a mixed fertilizer, or treated for the sepn. of the constituent nitrates or the production of nitric acid by known methods.

O. P. R. O.

Geology

Some methods for heavy mineral investigations. R. D. REED. *Econ. Geol.*, 19 [4], 320–37(1924).—The paper discusses methods adapted to correlations by the study of heavy mineral residues.

C. W. O.

Manufacture of potash and other salts from leucite. J. W. HINCHLEY. *J. Soc. Chem. Ind.*, 43, 158–69(1924).—The fact that the whole of the world's supply of potash is still obtained from practically one district is a matter of concern to other nations. The most hopeful source of supply is in the minerals of igneous rocks, and of these leucite, which occurs along the line of the Italian volcanoes, is the most attractive. Leucite, $K_2O \cdot Al_2O_3 \cdot 4SiO_2$ in a state of purity contains 21.5% K_2O , 23.5% Al_2O_3 , 55.0% SiO_2 . The natural mineral contains less potash through replacement by MgO and Na_2O , but in some places, notably Rocca Monfina, fine leucite occurs in large quantities, computed by H. S. Washington to contain 1008 metric T. of K_2O . Voelcker finds that powdered leucite has the same manure value as soluble manures of the same potash content. The Rocca Monfina industry is being developed by Baron Blanc, who found that if acid be continually circulated through granular leucite a soln. was obtained in which no gelatinous silica occurred to make the sepn. of liquid and solid difficult. With sulphuric acid, potash alum is formed, and the residual silica is added to caustic to form sodium silicate. The yield of alum and sod. silicate is 80%. As the market for alum is not large, Blanc also treats leucite with HCl which presents greater chem. engineering difficulties on account of the volatility and greater corrosive action of HCl . The plant must be completely closed, with a vent connected to a scrubbing tower for removal of fumes. The product KCl and Al_2Cl_6 are passed into a cooling app. where KCl crystallizes out. The liquor is treated with HCl gas and hydrated aluminum chloride crystals are pptd. These heated to $280^\circ C$ yield al. hydroxide and HCl . The yield is 93%. One T. of leucite requires 618.3 kg. of HCl gas or 197.6 kg. of H_2SO_4 . Taking factory operations, handling 36 T. of leucite per day, 5 T. of HCl would be required. The cost of fuel would be \$0.70 per T. of leucite treated, and the products would amt. to $10\frac{1}{4}$ T. KCl , 8 T. alumina, and 9 T. silica. Other processes than Blanc's are: Haege's process for making a phospho-potash fertilizer, an acid process using HNO_3 , an elec. fur. process for pot. carb. and alumina, and an autoclave process for producing caustic potash from leucite and lime; the last two due to Jourdain.

H. H. S.

Systematizing combustion practice for educational purposes. C. BLACHER-RIGA. *Feuerungstechnik*, **12** [11], 81(1924).—Tabulates for comparative purposes the principle characteristics accompanied by simple line sketches of (1) Boiler fur., (2) Gas generators. These tables cover in a very compact and comprehensive way the various methods used in practice and show clearly the general principles involved. F. A. W.

Measurement of the surface tension of glass. AD. LECRENIER. *Bull. soc. chim. Belg.*, **33**, 119–22(1924).—The drop wt. method was used, results being calcd. from Gualmo's formula $\alpha = (p/2\pi r)(1 + r/R)$, where α is the surface tension in mg./mm., p the wt. of the drop in mg., r the radius of the dropping orifice in mm., R the radius of curvature of the tip of the drop. The app. consisted of a Pt crucible with an orifice in its bottom ($r = 1.928$ mm.) suspended in a vertical tubular elec. fur., a thermocouple being placed near the dropping tip. To det. p a large number of drops were collected by dropping into hot oil. R was detd. by permitting a drop to form but removing the crucible vertically from the fur. just before the drop fell, the drop being obtained suspended by a long glass thread; thus no distortion of the tip was introduced. A number of observations were made at each temp., the max. deviation being approx. 6%. For an ordinary soda glass the values of α were 41.58 (1025°), 41.42 (1125°), and 41.23 (1225°), while flint glass gave 39.66 (1025°), 39.16 (1125°), and 38.97 (1225°).

W. B. P. (C. A.)

Specific heats of products of combustion from gas furnaces. L. E. BIERMILLER. *Gas Age-Record*, **53**, 423–4(1924).—The sp. heats of CO₂, SO₂, H₂O vapor, N₂, O₂, and CO are recalcd. from the data of Lewis and Randall (*C. A.*, **6**, 3353) into units of B. t. u. per cu. ft. (at 60°F and 30 in. Hg) per °F for the temp. interval 60°F to t °F to make them directly applicable to industrial gas calcs. Curves are given.

H. G. B. (C. A.)

Production of pure alumina from clay. HARALD PEDERSEN. *Tids. kemi Bergvesen*, **3**, 161–4, 175–8(1923); **4**, 11–7(1924); *Teknisk Ukeblad*, **42**, 75–7, 83–6(1924).—A full report of a radically new process for the production of Al₂O₃ for Al manuf. The raw material was a common Norwegian clay contg. Al₂O₃ 16%, Fe₂O₃ 8%, CaO 2%, MgO 1%, Na₂O 2.5%, K₂O 3.5%, and SiO₂ 55%. As mined it contained 30% H₂O but was easily air-dried to 5–10% H₂O. A usable clay should contain not more than 4% of CaO and as much Al₂O₃ and K₂O as possible. The air-dried clay is kneaded and mixed with cold H₂SO₄ (chamber-acid). An excess of clay is best used to obtain a high yield of the acid and a better decompn. of the compds. of K₂O and Al₂O₃ than of the Fe compds. To 1 ton of clay 1.2 ton of the acid was theoretically required, whereas 0.7 ton was found to give the best economy. The reaction mixt. was allowed to remain quiet for 12 hrs. and then was heated to 150–200°. The SiO₂ is thus converted to an amorphous, easily filterable state and part of the FeSO₄ is converted to basic ferric sulfate, the liberated H₂SO₄ attacking the excess clay and forming additional amts. of Al and K sulfates. The mass was then leached counter-currently, the temp. being kept at about 80°. At this point considerable amts. of Fe are sepd. as basic ferric sulfate and an extra amt. of Al and K is dissolved from the excess of clay. The resulting residue contained 8% of total H₂SO₄ calcd. to dryness. The liquor had a sp. gr. of about 1.35 and contained 80 g. Al₂O₃ and 20 g. K₂O per l. The Fe content was about 16% of the Al₂O₃, whereas in the original clay the ratio was about 40–100%. The liquor was cooled to 15° whereby $\frac{1}{3}$ of the Al₂O₃ was pptd. as K alum. The rest of Al₂O₃ was pptd. by addn. of solid K₂SO₄ under agitation at a relatively low temp. From 1 cu. m. liquor 700 kg. of raw alum with 0.1% Fe was obtained. This salt was dissolved in hot water and recrystd., yielding an alum with only 0.005–6% Fe. The water of crystn. was removed by heating in a rotary drum with producer gas. Drying in Fe pans was not successful owing to the viscosity and low heat condy. of the fused salt and its action on the iron. No

H₂SO₄ was expelled during the drying. The decompn. of the alum offered great technical difficulties, and was finally accomplished by heating directly with producer gas in a vertical shaft furnace^e charged at the top and discharged at the bottom. The gases contained 8 vol. % of SO₂. The decompn. product corresponded very closely to the formula Al₂O₃.K₂SO₄. It was leached hot with a soln. of K₂SO₄ satd. cold, the dissolved K₂SO₄ being pptd. by cooling. Per ton of Al₂O₃ produced something over 400 kg. of very pure K₂SO₄ was obtained. The residual Al₂O₃ from the filters contained about 50% H₂O which was easily removed by heating to 400–500°. The consumptions of coal and H₂SO₄ per ton pure Al₂O₃ were as follows: Heating the reaction mass 375 kg., drying the alum 800 kg., decompn. of the alum 600 kg., drying the oxide 200 kg., heating various liquids 316 kg., total 2,291 kg. Loss of H₂SO₄ by decompn. 36 kg., in the clay residue 1260 kg., in the alum 3221 kg., in the mother liquor 516 kg., total 5033 kg.; recovered by decompn. of the alum and absorption 2,855 kg., resulting net consumption 2,178 kg. When the market value of the recovered K₂SO₄ is taken into account a smaller net cost per ton of Al₂O₃ produced from clay by this procedure is obtained, compared with Al₂O₃ produced from bauxite by the Bayer process. The use of *labradorite* was tried in this process, but although the Al content of this material (about 30%) is much higher than in clay the latter is more favorable, owing to the valuable K₂O content. Labradorite contains no K₂O but much H₂SO₄-consuming CaO.

C. H. A. S. (C. A.)

General

Spontaneous combustion of coal. J. I. GRAHAM. *J. Soc. Chem. Ind.*, **43**, 79T–87T(1924).—Two theories regarding spont. combustion have been held, one that it is due to pyrites (FeS₂) oxidizing to FeSO₄; the other that it is the result of oxidation at ordinary temp. of org. subs. in coal. The pyrites theory does not explain all cases nor is a high rate of oxidn. of coal the only factor. A most important property is that of friability, the prodn. of fine dust being a necessary factor. With regard to the constituents of coal, G.'s result on oxidn. of durain, clarain, and vitrain, agree with those of Wheeler and Tideswell, but differ markedly in respect to fusain. G. finds that fusain from different sources shows very slight absorpn. and similar results have been found more recently by T. and W.

H. H. S.

BOOK

DUNN, J. T., D.Sc.: **Pulverised and Colloidal Fuel.** Pp. 197. London: E. Benn, Ltd. 1924. Price, 25s.

H. H. S.

BOOK REVIEW

A Preliminary Report of the Clays of Florida (Exclusive of Fullers' Earth). By OLIN G. BELL, 1924. 207 pages. From the Fifteenth Annual Report of the Florida State Geological Survey, Tallahassee, Florida.

This report considers only the known clay deposits within reach of transportation and without excessive overburden. The general geology, classification, mineralogy, chemical and physical properties, and uses of the clays are briefly discussed. Complete footnote references are made to other writers. The clays were tested by Mr. Bell in the clay testing laboratory of Dr. H. Ries at Cornell University.

The contents of the report are briefly reviewed by chapters.

Chapter I. General Geology of Clays. The term clay is defined, and the origin of clays and the various geologic types of clay deposits are given.

Chapter II. Classification of Clays. The classification of Ries is given based primarily on the geological occurrence and secondarily on the firing qualities of clays.

The classification of Grout and Soper is given based on physical properties with refractoriness as the basis of subdivision. Reference is made to Parmelee's classification which is based on the uses of clays according to their physical properties.

Chapter III.—Mineralogy and Chemical Properties of Clays.—The various minerals found in unfired clays are noted together with the abundance, physical properties and pyrochemical behavior of the respective minerals. The minerals found in fired clays are discussed briefly. The relative merits of ultimate versus rational chemical analysis are given. Included is the information obtainable from an ultimate chemical analysis as listed by Ries. The chemical effect of the various constituents in clays on the firing behavior of the clay is also given.

Chapter IV.—Physical Properties of Clays.—The more important physical properties are treated. The nature of the vitrification process, as discussed by Orton, is given. The Seger cone numbers, as commonly used for guidance in the firing of the different classes of ware listed, are indicated in a table. A chart is also given showing the important firing range temperatures of various clay products.

Chapter V.—Tests Made Upon Clays.—The methods used in the determination of the physical properties, both in the unfired and fired state, are given.

Chapter VI.—Kinds of Clays and Their Uses.—The physical properties of the different kinds of clays are noted together with their chief use. The uses of raw and fired clay as listed by Ries are also given.

Chapter VII.—Geology of the Clays of Florida.—The stratigraphy of the geologic formations in Florida is thoroughly covered in a table. The physical nature, location, extent and thickness of the various formations are noted together with the geologic age, occurrence and distribution of the clays. The conditions of sedimentation and sources of material are also discussed.

Chapter VIII.—Distribution and Description of Deposits by Counties.—The various clay deposits are described with reference to their extent, properties and uses. The more important physical properties of the unfired clays and of the clays fired to different temperatures have been determined and the results listed. The various uses to which each clay is suited are also given. A number of views of plants and clay pits are shown. A map of Florida shows the location of ceramic plants, kaolin mines, Fuller's earth mines, points where common clays were tested and sedimentary kaolin occurrences.

Chapter IX.—Sedimentary Kaolin.—The terminology of the clay is discussed and its general distribution given. The deposits are described and their geologic age discussed. Various theories are given for their origin. The history of their development is noted together with their uses, the names of companies working the deposits and the methods of mining employed. Samples from the different producers were tested and the results obtained on the unfired specimens, as well as on those fired to different temperatures are noted. Results of chemical and mineralogical analyses are given. Distribution of the deposits is given by counties. Some plant views are shown.

Chapter X.—Development and Possibilities of the Clay Industry in Florida.—A history of the development of the industry is given and the present status described. The future possibilities based on the local potential demand are noted.

Chapter XI.—Methods of Prospecting for Clays.—A procedure is recommended for making the preliminary tests and for determining the extent and uniformity of the deposit.

Appendix A.—Statistics of Production of Brick (1899 to 1922).

Appendix B.—Fusion Points of Seger Cones (including chemical composition).

Appendix C.—Directory of Florida Clay Workers (exclusive of Fuller's earth).

Appendix D.—Bibliography of Florida Clays.

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A Bibliography of clays and the ceramic arts, published in January 1906. Copy will be sent upon receipt of 12c postage to cover.

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CERAMIC ABSTRACTS

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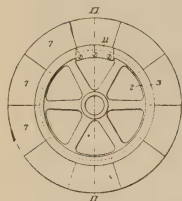
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Abrasives

PATENT

Sectional grinding wheel. FRANK J. TONE. U. S. 1,502,697, July 29, 1924. A grinding wheel including a supporting drum, segmental blocks of grinding material arranged in a plurality of circumferential rows, and means common to adjacent rows and extending circumferentially of the drum for retaining the segments thereon.



Cement, Lime and Plaster

Action of gypsum on the setting and hardening of cement. FRIEDRICH TIPPMANN. *Zement*, **13**, 135-6, 147-50(1924).—During a 12-mo. period T. observed the rate of crystn. and gel formation of various clinkers immersed in distd. H_2O and in $Ca(OH)_2$ soln. Crystals visible under low magnification developed in the solns. of SO_3 -free clinkers in 1 day, while those contg. 5% gypsum showed crystals after 8 days, with definite gel formation. The SO_3 -free cements had no tendency to swell. The action of gypsum is to retard the crystn. and to promote colloid growth. The flash set is due to crystn. the later set and hardness to colloid action. H. F. K. (C. A.)

Enamels

Heat-transference in enamel-lined apparatus. E. P. POSTE. *Ind. Eng. Chem.*, **16**, 469-70(1924); *J. S. C. I.*, **43B**, 541(1924). H. H. S.

Enameled apparatus from a chemical engineering standpoint. E. P. POSTE AND MAX DONAUER. *Ind. Eng. Chem.*, **15**, 469-71(1923).—Enameled app. is finding increased use in chem. processes. The enameler must produce an enamel that will meet its special requirement fully. As the severity of acid corrosion becomes greater it is necessary to limit the size and shape of the vessel to insure a perfect enamel coating. W. H. B. (C. A.)

Enamel-lined apparatus. E. G. MINER. *Chem. Met. Eng.*, **28**, 687(1923).—Enameled steel tanks will withstand very high pressures as well as possess non-corrosive and acid-resisting properties. Coördinated efforts have resulted in standardization of units, as follows: a standard jacketed still with reducing ell, for the distn. of essential oils and acids, the reduction of fats, etc., a standard jacketed closed mixing tank with enameled steel agitator, an open evapg. or crystg. pan, a standard utility pot, and special equipment. W. H. B. (C. A.)

PATENTS

Enameling process. HENRY MOECKER, JR. U. S. 1,503,991, Aug. 5, 1924. In an enameling process, the steps of applying to the article prior to the application

of the enamel, wet patterns, then applying the enamel to the article and allowing it to dry, and then removing the dry patterns to effect a removal of the enamel from the article in the desired places prior to the fusing of the enamel.

Enamel opacifying composition and process of making the same. HUGH SPENCER COOPER. U. S. 1,502,421, July 22, 1924. Process of treating naturally occurring zirconium silicate to produce an enamel opacifier, which comprises wet-milling the material to a condition of extreme fineness, treating the milled material with an acid and then washing, drying, and strongly igniting the material.

Zirconium containing composition and process of making the same. HUGH S. COOPER. U. S. 1,502,422, July 22, 1924. Process of treating zirconium silicate, which comprises wet-milling the silicate to a condition of extreme fineness, reacting upon the milled material with concentrated sulphuric acid, and removing residual acid and substances rendered soluble thereby.

Insulating enamel on wires, etc. L. DE RAPHELIS-SOISSAN. U. S. 1,495,632, May 27. Wire or the like to be coated with insulating enamel is first given a ground stratum of a flexible porous substance, *e. g.*, asbestos, powd. enamel is applied to this, shaped and heated to the m. p. to produce an overlying enamel coating. (C. A.)

Glass

Basic glass. A. BIGOT. Meeting (May 2) of Soc. de Chem. Industrielle. *J. Soc. Chem. Ind.*, **43**, 513-4(1924).—City refuse can be profitably treated by incinerating the non-fertilizing portion under boilers for electrical generation, and fusing the residues with fluxes to make glass for bottles, insulators, and the like. H. H. S.

Hydration of natural and artificial glasses. G. SCHOTT AND G. LINCK. *Kolloid-Z.*, **34**, 113-6(1924); *J. S. C. I.*, **43B**, 422(1924). H. H. S.

Effects produced by chilling glass. A. Q. TOOL AND C. G. EICHLIN. *J. Opt. Soc. Amer.*, **8**, 419-49(1924); *J. S. C. I.*, **43B**, 468(1924). H. H. S.

Noteworthy productions of the glass craftsman's art. I. The reproduction of the Portland vase. JOHN NORTHWOOD. *Jour. Soc. Glass Tech.*, **8** [30], 85(1924).—A brief history of the original Portland vase, and a description of probable methods of manuf. The successful reproduction of the vase in glass by John Northwood and Philip Pargeter, the artist is described. J. G. P.

Noteworthy productions of the glass craftsman's art. II. Mr. John Northwood's Plaque of Aphrodite. W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **8** [30], 92(1924).—A description of the Cameo Glass Plaque, completed by John Northwood in 1906, and of methods used in the production. J. G. P.

The thermal endurance of glass. I. VAUGHAN H. STOTT. *Jour. Soc. Glass Tech.*, **8** [30], 139(1924).—A formula is derived which det. the time which elapses before rupture occurs after a given change in temp. Exptl. data are given. In conclusion it would seem that while, from the point of view of thermal endurance, a suitable glass for a specific purpose can be selected from a knowledge of its phys. properties, it is more difficult to det. the best methods of making any actual article, or to arrive at a proper method of testing its suitability when made. It does not appear desirable at the present stage to standardize any specific method of testing for thermal endurance, in view of the doubt which exists how far the results of any such test which can be readily applied may correspond with the service behavior of the product tested. J. G. P.

The use of pyrometers in the glass industry. E. A. COAD-PRYOR. *Jour. Soc. Glass Tech.*, **8** [30], 94(1924).—The value of pyrometric equipment in a glass factory depends essentially on three factors, namely, on (1) the trustworthiness of the pyrometer itself, particularly the clockwork, (2) the skill which is expended on its maintenance and (3) the attitude with which the management, foreman and fur. operators regard

it. The value of the pyrometer for the various operations in glass manuf. is pointed out, the different types of pyrometers are taken up, and the relative merits of each type for the different operations are discussed.

J. G. P.

Continuous high temperature measurement in glass works. WILLIAM M. CLARK. *Jour. Soc. Glass Tech.*, 8 [30], 105(1924).—A résumé of the advantages derived from the use of pyrometric equipment, with suggestions as to their use for continuous high temp. measurement.

J. G. P.

Practical applications of pyrometers to glass works. C. E. FOSTER. *Jour. Soc. Glass Tech.*, 8 [30], 109(1924).—Thermocouple pyrometers, pyrometers for meas. high temps., optical pyrometers, total radiation pyrometers are taken up and discussed. The proper use of pyrometers described, and the practicability of pyrometric practice in glass works is pointed out.

J. G. P.

Some reflections on pyrometer design and a description of a new radiation pyrometer. W. BOWEN. *Jour. Soc. Glass Tech.*, 8 [30] 117(1924).—In the practical application of pyrometry the pyrometer should be simple of design and operation, robust, or free from liability to breakdown under shock or accident, flexible to meet practical conditions, durable, have a speedy response to temp. changes, be free from dependent conditions such as distance, or personal error, and should be accurate. A new radiation pyrometer has been devised. The principle of operation depends on the Stephan-Boltzmann Law of Radiation. The instrument has a lens in place of the usual mirror reflector, to concentrate the radiation on to a thermocouple situated at its focus. The heat so concd. develops an electromotive force which is transmitted to the millivoltmeter, the scale of the latter being calibrated in temp. degrees in the usual way. An eyepiece is fitted to the face of the instrument, to assist the operator in centering the field of vision on the hot body. All these parts are fitted in a casing, so as to form one single unit, of extreme portability and compactness. The pyrometer is applied like a telescope. The time required to take a reading is between 2 and 3 seconds. The distance factor is approx. 24 to 30 and can be increased to as high as 40.

J. G. P.

The cause of color produced in glasses of anhydrous borax and NaPO_3 by fusion with metallic oxides. T. COHN. *Chem. News*, 129, 32(1924).—A color chart using NaPO_3 and borax is given with the change on increasing the concn. of the oxides of Co, Ni, Cu. Protracted hgt. was tried to see if a change in color could be brought about. The beads were dissolved to see if the color was due to colloidal suspensions and found to be metallic salts. The conclusion arrived at was that the beads of Cu, Ni, Co, in borax and NaPO_3 were due to colored metallic salts and that Ag, Pt, and Au give colloidal suspensions.

S. S. C.

Industrial pyrex. A. E. MARSHALL. *Chem. Met. Eng.*, 28, 690-2(1923).—Desirable qualities of plant construction materials include: resistance to chem. corrosion, heat and temp. changes, a reasonable degree of mech. strength, possibility of production in a variety of shapes and a cost within com. possibility. Pyrex possesses many desirable phys. and chem. characteristics, but with limits as to size or requiring the development of new types of construction based on available shapes. It is industrially applicable: where acid resistance is important; where resistance to heat shock is desirable; where purity of product is essential; and transparency is involved. Applications to each class are mentioned.

W. H. B. (C. A.)

Estimation and removal of iron in glass-making sands. L. SPRINGER. *J. Soc. Glass Tech.*, 7, 234.—Previous attempts to reduce the amt. of Fe in sands had not met with much success. The Badische Anilin- und Sodafabrik, Ludwigshafen, had recently described a process as follows: "Washed sand without drying is covered with twice its weight of water, and 1% of concd. H_2SO_4 added and well mixed in. Then 1% of 'Blankit' (which is essentially a reducing agent) is added and thoroughly mixed

in. In 5 or 10 min. the liquid becomes turbid and is run off. The sand is then washed with water 2 or 3 times and dried." Samples of Hohenbocka sand after treatment were whiter. By ignition, it turned to a weak yellow tint contrasted with the strong reddish yellow of the ignited but untreated sand. Expts. on a Saxon grey sand failed to improve its color. Analyses showed before and after purification, resp.: Saxon sand, Fe_2O_3 0.050, 0.040%; Hohenbocka sand, Fe_2O_3 0.040, 0.032%. According to S., only the iron coating of the sand grains was removed by the Blankit or by treatment with HCl. This was of little use for the glass industry, but of more use for clay-working industries. Expts. were then made to ascertain if calcination would materially improve the Saxon sand. An unwashed sample, ignited at 1200° and analyzed in a Bohemian glass technological lab., showed only 0.02% of Fe_2O_3 . S. then carried out numerous expts. to verify or refute this apparently remarkable result. In particular, it was desired to find out whether a Grade II sand contg. more than 0.03% of Fe_2O_3 and suitable for making ordinary white glass could be converted by calcination to a Grade I sand contg. less than 0.03% of Fe_2O_3 . As a check on S.'s analysis, sands were sent for analysis to other labs. specializing in silicate analyses. Conflicting results were obtained. Some results indicated that the iron content of a sand was reduced by calcination, and, moreover, that the loss was increased by increasing the ignition temp. Some indicated that no appreciable good resulted. Finally, the Saxon sands calcined on a fairly large scale in a window glass glory hole at 1000° for 5 hrs. were used in a series of melting and decolorizing expts. in a crystal glass furnace, but the results were unsatisfactory.

H. G. (C. A.)

A new shock- and heat-resisting glass. J. WOLF. *J. Soc. Glass Tech.*, **7**, 240-1.—The new glass, claimed by its inventor, Dr. Horak, to be unbreakable, and recently produced commercially in the form of app. and cooking vessels under the description "Resista" glass, has the percentage compn.: SiO_2 78.94, B_2O_3 13.50, Na_2O 2.78, K_2O 1.93, MgO 0.97, Al_2O_3 0.93, CaO 0.28, Fe_2O_3 0.47, TiO_2 0.07. In essentials, therefore, it differed but little from the well known Pyrex glass, having nearly 2% less SiO_2 and about 2% more B_2O_3 , and having also a small amt. of MgO . As one of the specimen cooking vessels broke in use almost immediately after purchase, the glass was not unbreakable, although other specimens showed it to be resistant. Three batches were suggested for the prepn. of the glass, namely: Hohenbocka sand 100, Bohemian feldspar 8, magnesite 3, KNO_3 5, cryst. borax 20, cryst. boric acid 20; Salesel kaolin sand 100, phonolite from Bileri 13.5, dolomite 1.3, cryst. borax 22.0, cryst. boric acid 13.3; sand 100, KNO_3 4.75, marble 0.40, magnesite 2.75, cryst. borax 14.80, cryst. boric acid 18.4, phonolite 60.

H. G. (C. A.)

The density of glass and the process of melting. H. SCHALL. *J. Soc. Glass Tech.*, **7**, 242.—The decrease in the d. of molten glass with increase of temp. would appear to prevent circulation and so to retard melting. Actually circulation did occur. This was due to the escape of gas bubbles from the top layer of glass, which accordingly became denser and sank. Batch usually floated, but when filled into a very hot pot contg. only a little molten glass it sometimes sank and adhered to the base of the pot, subsequently becoming detached and causing batchy metal. To prevent this, a ladle of cullet should first be filled on.

H. G. (C. A.)

The electrical conductivity and transition points of glasses. HERBERT SCHÖNBORN. *Z. Physik*, **22**, 305-16(1924).—The equation of Hinrichsen and Rasch (C. A., **5**, 30): $\log W = (\nu/T) + C$, where W is the resistance, T abs. temp. and ν and C are consts., holds for glass through its m. p., abrupt changes in the slope of the curve of $\log W$ against $1/T$ being interpreted as transition points in the region of the "crit. zone" for thermal expansion.

D. C. B. (C. A.)

The use of filter plates made from sintered glass. P. H. PRAUSNITZ. *Chem.-Ztg.*,

48, 109-10(1924).—A description of Schott & Gen. (Jena) sintered glass filter plates and their uses. The plates are made by sintering together pulverized glass particles of definite size; they can be melted into any kind of vessel made of the same Jena glass, thus dispensing with the prepn. of filtering mediums like asbestos fiber, shredded filter paper, Gooch crucibles and similar devices. The plates are made in sizes 10-120 mm. Examples of their use in analytical chemistry, chem. prepn. and electrochemistry are offered.

W. C. F. (C. A.)

Quartz ware and quartz glass. Z. V. HIRSCHBERG. *Z. angew. Chem.*, 37, 99-100 (1924).—A review.

G. E. B. (C. A.)

The "Spiegel" group of glasses. E. ZSCHIMMER. *J. Soc. Glass Tech.*, 7, 163-4.—To find the relationship between the compn. and the chem. stability of glasses of the so-called "Spiegel" group (that is, soda-potash-lime-silica glasses), Z. studied 249 com. glasses of which the compns. had been published by various workers and the stabilities observed either quantitatively or qualitatively. The method used was to mark the compns. of the glasses on a 4-dimensional diagram, and at the points obtained to indicate the relative stabilities. By this means approx. boundaries could be marked. The glasses were divided into 3 groups, (1) resistant (approximating to Class II of Mylius), (2) medium (Class III), and (3) bad; and the following useful rules were deduced: All glasses in the first 2 groups had a lime content lying between 7.5 and 15%. Resistant glasses had a total alkali not exceeding 13%. Medium glasses were those with a total alkali content from 13 to 19%.

H. G. (C. A.)

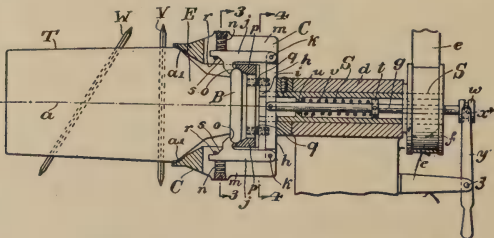
Critical discussion of a glass furnace. R. W. MULLER. *J. Soc. Glass Tech.*, 7, 197.—A description of a 14-pot furnace which did not come up to expectations.

E. J. C. (C. A.)

PATENTS

Glass-feeding mechanism. EDWARD MILLER. U. S. 1,500,879, July 8, 1924. In app. of the kind described, a glass tank spout with a discharge opening in the bottom thereof, a shear arm mounted below the spout and having an opening through it registering with the opening in the spout, a knife reciprocably mounted on said shear arm for severing the glass, and means for lowering the shear arm as the glass descends from the spout and for elevating the shear arm after the glass has been severed.

Method of producing glassware. JOHN A. MILLIKEN. U. S. 1,503,962, Aug. 5, 1924. The method of producing an article of glass, which consists in forming said article with an integral extension provided with a shoulder portion, exerting tension on said extension in a direction longitudinally thereof for holding said shoulder portion against an abutment, decorating said article by grinding while so held, and thereafter while rotating severing said article from said extension.



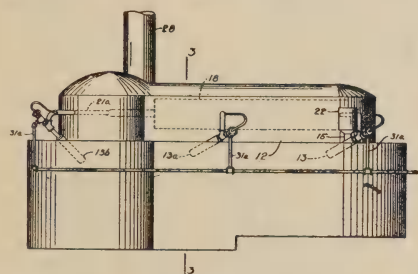
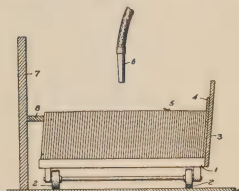
Machine for making bottles, etc. WARREN E. GLASPEY. U. S. 1,502,560, July 22, 1924. In a machine of the character set forth, the combination of a mold-carrier,

a series of molds carried thereby, nuts carried with said molds, threaded mandrels working through said nuts, frictionally held gears mounted on the lower ends of the mandrels, yieldingly mounted racks disposed on opposite sides of the path of said gears, one of said racks being adapted to turn the gears in a direction to elevate the mandrels and the other of said racks being adapted to turn the gears in the direction to lower the mandrels, and stops serving to limit the raising and lowering of the mandrels.

Machine for making bottles, etc. WARREN E. GLASPEY. U. S. 1,502,561, July 22, 1924. In a machine of the character set forth, the combination of a mold-carrier, a series of molds carried thereby, a non-rotating mandrel associated with each mold and equipped with a sheathable lug-forming member, and means for raising and lowering the mandrels.

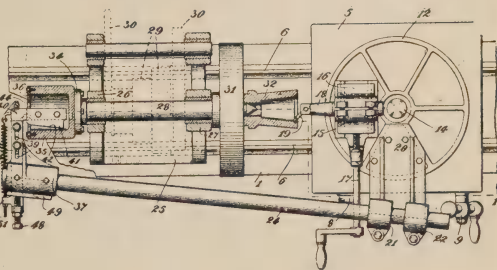
Process of finishing the edges of glass sheets. AUSTIN C. HILEMAN. U. S. 1,503,586, Aug. 5, 1924. The process of finishing the edges of glass sheets which consists in placing a series of the plates side by side with their adjacent side surfaces in opposition and close together and with the edges to be treated in substantial alignment, and then applying a sand blast to the said edges.

Glass-making apparatus. WILLIAM R. SMITH. U. S. 1,500,651, July 8, 1924. A glass-making app. comprising a closed tank formed to confine a body of molten glass, an elongated tubular melting twyer extending through the wall of the tank, the inner

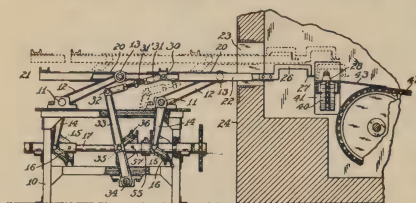


end of the twyer constituting a burner located within the tank above the bottom thereof, means for admitting gas and air under pressure to the outer end portion of the twyer, and means for delivering glass materials to the flame resulting from combustion at said burner, so that said materials may be projected into the tank, melted by the burner flame and accumulated in a molten condition in the tank below said burner.

Device for making fluted glass molds or the like. PETER KUCERA. U. S. 1,502,474, July 22, 1924. A device for manufacturing fluted molds for glass machines and the like comprising a main shaft, means for mounting a mold body on said main shaft, a pattern member also mounted on said main shaft, a turntable, a forming tool mounted on said turntable and adapted to operate upon said mold body, and an actuating device coöperating with said pattern to oscillate said turntable and said tool to produce a predetermined configuration on said mold. A device of the character described comprising a main shaft, work supporting means on one end of said main shaft, a pattern member on the other end of said main shaft, a forming tool adapted for rotation relatively to said main shaft, means to feed said tool longitudinally of the work, an actuating device carrying the templet and being adapted to oscillate said tool to cause same to follow a predetermined path, a templet adapted to engage said pattern, and stop means adapted to determine when said oscillation shall begin relatively to the feed of the tool.



Leer feeder. MINOT K. HOLMES. U. S. 1,501,602, July 15, 1924. A leer feeder comprising a main frame, a pair of rock shafts journaled on said main frame, a pair of

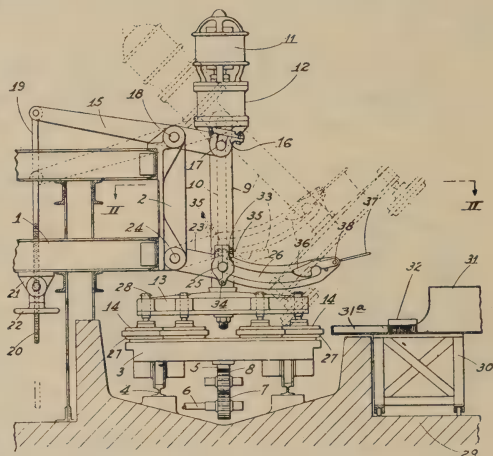


arms carried by each rock shaft, each of said arms being provided with a push frame support, a push frame slidably mounted upon said push frame supports, a main drive shaft, cam mechanism on said shaft, connections between part of said cam mechanism and the rock shafts and connections between another part of said cam mechanism and the push frame whereby rotation of the

shaft will produce vertical and horizontal reciprocations of the push frame, and means for relatively adjusting the cam mechanism to adjust the push frame vertically.

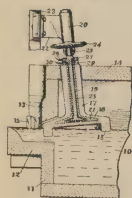
Apparatus for surfacing plate glass. JOHN H. FOX. U. S. 1,501,327, July 15, 1924. In combination in a glass surfacing machine, a framework, a surfacing unit mounted for vertical movement with respect

to the framework and for lateral swinging movement about its upper end, and comprising an upright supporting member, a vertical shaft journaled therein, and a runner secured to the lower end of the shaft, driving means for the shaft, releasable means for holding the lower end of said unit against lateral movement, means for carrying the glass to be surfaced laterally beneath the runner, and means for holding the unit in inclined position after said last means are released and the lower end of the unit swung laterally.



Process for making glass-mold plungers. JACOB SODERBERG. U. S. 1,501,246, July 15, 1924. A process for making plungers for glass molds for producing

lenses having superimposed annular and transverse surfaces, which consists in forming the plunger of a base plate and a plurality of transverse strips substantially rectangular in cross-section by assembling and securing the strips side by side to the base plate to provide a composite plate, machining the front face of such composite plate to provide a series of annular prisms upon the face of the plate, and then removing the strips from the base plate, securing them upon a second base plate surfaced to tilt the strips from the positions occupied in their preceding positions and give them the various inclinations desired for the formation of said transverse surfaces.



Glass-circulating mechanism. LEONARD D. SOUBIER. U. S. 1,502,068, July 22, 1924. The combination of a tank to contain molten glass, said tank comprising a main portion and a forehearth projecting beyond a wall of the tank to expose a surface of the glass, a glass circulating device within said main portion of the tank behind said wall,

and means to actuate said device and thereby maintain a continuous circulation of the glass forming said surface.

Annealing leer for plate glass. H. WADE. Brit. 212,997, Dec. 21, 1922. (C. A.)

Drawing sheet glass. E. ROWART. Brit. 212,545, March 5, 1923. (C. A.)

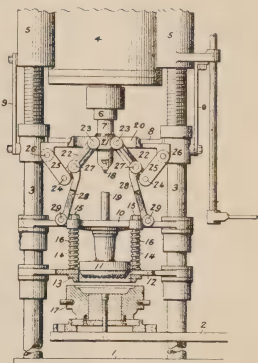
Glassworking apparatus. JESSE M. SAID and DAVID E. GRAY. U. S. 1,501,868, July 15, 1924. In a machine for pressing articles of glass, the combination of vertical standards having slidably mounted thereon a plunger cross head, and levers for actuating said plunger cross head, the levers both having a floating fulcrum and a floating point of resistance separated from each other.

Detergent. F. BRAUN. U. S. 1,494,147, May 13. A soln. for cleaning glass or ceramic ware is formed of alc. 40, glycerol 4, 5% soln. of citric acid 60 and dil. HOAc 24 parts.

Heavy Clay Products

Sand-lime brick process. ANON. *J. Soc. Chem. Ind.*, 43, 508(1924).—Sand is mixed with 5–10% slaked lime, and the thoroughly mixed semi-dry mass is put through a brick molding machine operating at 2 tons per sq. in. pressure. It is then exposed for 10 hours in closed cylinders to steam at pressure 120 lbs., temp. 350°F. The lime must contain not the slightest trace of unslaked lime, otherwise the bricks expand or become distorted, or they are weak and friable. Sand-lime bricks have a crushing strength of 330 tons per sq. in., and they are less absorbent to water than ordinary bricks, while possessing equal porosity as regards air. Every brick is a "facing" brick, and they require less mortar to lay them.

H. H. S.



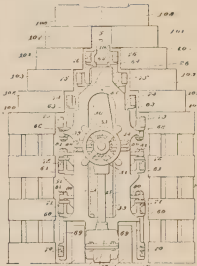
PATENTS

Brick and wall construction. GRAFTON E. LUCE. U. S. 1,503,327, July 29, 1924. A building unit eccentrically weighted and having a handhold positioned eccentrically with regard to the unit, but directly over its center of gravity.

Collapsible arch-form for brick-kilns.

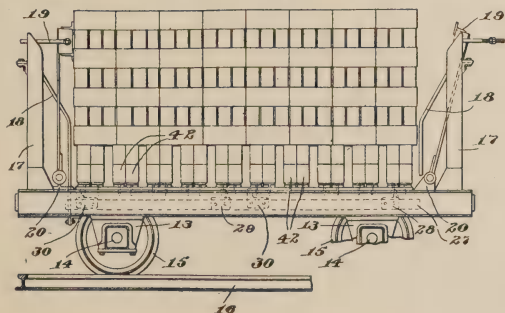
GRAFTON E. LUCE.

U. S. 1,500,949, July 8, 1924. Apparatus of the kind described, consisting in a form for setting arches in a brick kiln, having brick engaging and aligning means for both sides and top of the arch, in combination with means to withdraw the brick engaging members before the form is removed from the arch, said with-



drawing means simultaneously drawing inwardly and downwardly the brick engaging members.

Finger-course unit car. CLAUD E. FULLER. U. S. 1,503,452, July 29, 1924. In an improved finger-course unit car, the combination of a frame, a plurality of parallelly arranged bars or plates extending laterally of said frame, and means for arranging said plates or bars in pairs.



Refractories

Grading of silica bricks. P. B. ROBINSON AND W. J. REES. *Trans. Cer. Soc. (Eng.)*, **23**, 1-12.—Seven brands of silica brick made from rock contg. 95-98% silica mixed with 1.5-2% lime were examd. both in the green state and after firing. Conclusions: (a) A hard fine-grained rock crushing into fragments of high angularity should be used. (b) Grinding should be such that the largest particles will be about 6-7 mm. in diam., with about 40% of the mat. retained on a 30-mesh sieve. These large angular particles give strength to both the green and burned brick. (c) With the ganisters ordinarily used the above specif. for coarse mat. will produce more than 40% of mat. passing through a 90-mesh sieve. This fine mat. is necessary to produce compactness in the brick and for the production of a melt which will promote the inversion of the quartz on burning. H. F. S.

Tridymite and tridymite bricks. O. REBUFFAT. *Trans. Cer. Soc. (Eng.)*, **23**, 14-5.—Refers to previous note and patents (*Trans. Cer. Soc. (Eng.)*, **21**, 66). If quickly raised to 1400°C coarsely powdered quartz blended with a very small quantity of "multiple catalyst" is completely transformed after 5 or 6 hrs. heating with an increase of vol. of $\frac{1}{6}$ or $\frac{1}{7}$ and production of a product having a sp. gr. of 2.23 to 2.26 "which must consequently be considered as almost pure tridymite." This mat. does not change in density on further hgt. until 1700°C when vitreous silica is formed. R. does not believe that cristobalite is necessarily formed by hgt. tridymite above 1450°C. H. F. S.

The effect of salty coal upon refractory materials. L. M. WILSON. *Trans. Cer. Soc. (Eng.)*, **23**, 39-50.—The effect of ammonium chloride on fire clay and silica brick was studied. Conclusions: (1) Confirm observation by J. W. Cobb that solids interact at temps. below the fusing point of either. (2) There is a critical temp. of 900°C where the chem. properties of burned fire clay seem to undergo a change quite apart from the critical temp. where the phys. properties of either raw or fired mat. are known to alter. (3) Silica refractories are superior to fire-clay refractories in resistance to salty coal. (4) At temps. between 700° and 1200°C ammonium chloride removes iron and alumina from fire-clay bricks or iron, alumina and calcium from silica bricks. H. F. S.

Reducing the cost of relining boiler furnaces. ANON. *Power*, **59** [26], 1028 (1924).—A method is described of patching old fur. linings by means of a refrac. cement of suitable properties so that it may be shot into cracks and crevices by means of a cement gun. The cement is a mixt. of ground fire-brick bats and silicate of soda. The article is illustrated with fur. wall photographs showing the character of fur. walls before and after relining the walls. C. J. H.

Ground fire brick for furnace repair. JOSEPH HARRINGTON. *Power*, **59** [25], 976(1924).—In the Cleveland Elec. Illuminating Co. plant, fur. walls are laid up with thick joints of a refrac. cement made of fire-brick grog mixed with a refrac. cement. Other fur. walls are of monolithic construction using this cement. The grog in the cement is ground fire-brick bats of the same quality as the brick of the walls. A dry pan is used to prep. the grog. A saving is claimed in laying up new walls with thick joints of this cement. The monolithic walls apparently show long life. C. J. H.

Furnace linings. GUY B. RANDALL. *Power*, **60** [4], 146(1924).—The refrac. mat. bonding agent and method of application are 3 important elements of a fur. job. Arches and walls made of fire-brick of uniform dimensions and laid up without bonding agents are emphasized. Photographs are shown of fur. walls which have been laid up with thick joints, the bonding agent running high in ground fire brick; and photographs of walls relined by the use of a cement gun. C. J. H.

Dolomite. L. M. PARSONS. *Trans. Ceram. Soc. (Eng.)*, **22**, 323-32(1922-23).—Dolomite (first described by Dolomieu in 1781) is the double carbonate of Ca and Mg and is distinct from the mixt. known as magnesian limestones. It contains 45% MgCO_3 . Dolomite rocks are grouped as primary or secondary. *Primary* dolomites are produced originally in the dolomitic state, either chem. by evapn. of salt-lake waters (*pptd.* or *proto-dolomites*), or mechanically by sedimentation of the prototype. *Secondary* dolomites are formed by chem. alterations of limestones, the influence being usually dissolved Mg salts, but, in rarer cases heated vapors contg. Mg compns. Secondary dolomites may be "contemporaneous" or "subsequent"; in the former type, limestone on the sea-floor is acted on by the Mg salts in soln. before the limestone becomes hard; in the latter, ground waters contg. Mg salts percolate through limestones which form part of dry land. In many cases, the ground waters have affected a limestone here and there so that the dolomite is in veins, streaks and patches. Most commercial dolomites are of the contemporaneous class. P. gives examples of all these types as they occur in England. H. H. S.

The manufacture of refractories in America. A. F. GREAVES-WALKER. *Trans. Ceram. Soc. (Eng.)*, **22**, 358-76(1922-23).—A description of American methods: The hand-made, stiff mud or steam press, soft mud, and dry press processes; drying methods, setting methods; burning methods, tunnel kilns; magnesite and chrome products; hand-made and machine-made silica products; plant equipment and organization. The English discussion centered on the size and waste space of tunnel kilns; appreciation of machinery like the discharging revolving bottom pan and poidometers; humidity driers; and the danger of hasty work incurred by allowing men to leave work early. H. H. S.

The specific heat of magnesite brick at high temperatures. A. T. GREEN. Communication No. 103, Stoke-on-Trent Clay and Pottery Lab. *Trans. Ceram. Soc. (Eng.)*, **22**, 393-7(1922-23).—Using 300 g. of mat. and 45 l. of water, G. obtd. the following values for actual sp. ht. at a def. temp.:

| Temp. | 100°C | 200° | 400° | 600° | 800° | 1000° | 1100° |
|---------|-------|-------|-------|-------|-------|-------|-------|
| Sp. Ht. | 0.239 | 0.250 | 0.271 | 0.293 | 0.313 | 0.334 | 0.345 |

This does not confirm Tadokoro who obtd. a max. at 600°C, using 3 g. of mat. in a Pt crucible. Bradshaw and Emery, and Heyn, Bauer and Wetzel, obtd. no such max. H. H. S.

The use of refractory materials in gas works. G. M. GILL. *Trans. Ceram. Soc. (Eng.)*, **22**, 377-92(1922-23).—The temp. of carbonization has in recent years been increased from 1280°C to 1400° in order to obtain a 50% increase output, and retorts which had a life of 1000 working days are now reqd. to be more permanent. The best mat., silica brick (95% SiO_2), often shows too much after-expansion and has to be built up instead of molded; it has also a tendency to spall. Fire clay shows too much after-contraction and a tendency to soften under load. G. suggests a semi-silica mat. contg. 76-92% SiO_2 according to the position in setting and the purpose for which it is required. 75% of the mat. should have an expansion or contraction of not more than 1% at 1400° C under load, and the remaining 25% not more than 1% at 1280° under load. Combustion-chamber arches should be of 95% SiO_2 . The standardization of dimensions of fire bricks and blocks is recommended. Diagrams accompany the paper. H. H. S.

Keramonit and thermonit. H. BECK. *Feuerungstech.*, **12**, 97-8(1924); *St. u. E.*, **44**, 634-5(1924).—Two new refractories. H. H. S.

The effect of coal ash on refractories. J. J. BRENNAN. *Combustion*, **10**, 418-22 (1924).—The metallurgical point of view is adopted, wherein the ash from the coal and the furnace lining are compared to a smelter charge and lining. Chem. analyses are

given of 9 coals and their ashes and of 14 bricks, Fe-free. Mixts. of 70% ground fire brick and 30% coal ash were prepd., each brick in combination with each ash, and molded into triangular cones, inclined at a 45° angle with the horizontal. These were mounted on slabs of highly refractory material. Similar cones were prepd. from each ash and from each brick alone. These were heated in a gas-fired furnace in a reducing atm.; 4 hrs. was required to reach the max. of 3000°F. The condition of the cones was observed at 20° intervals. The temp. of initial deformation of the cones, *i. e.*, when the tip assumed a horizontal position, was noted and the results were plotted. In the majority of cases, actual life of furnace linings follows closely the indications given by the charts.

J. F. B. (C. A.)

Refractory products. I. J. M. TEUNISSEN. *Het Gas*, **43**, 276-82, 323-7, 351-5 (1923).—A review on the material used for molding fire bricks, their methods of prepn. and their application in industry.

R. B. (C. A.)

Modern British blast furnaces. FRED. CLEMENTS. *Iron Coal Trades Rev.*, **108**, 959-64, 1024(1924).—A description of 4 blast furnace units, with detailed drawings of furnaces and stoves.

J. F. B. (C. A.)

New use for refuse refractory material. S. F. WALTON. *Iron Age*, **113**, 786-8 (1924).—Old fire-clay brick bats are ground up with a bond to form a highly refractory mortar. Economies claimed are: the mortars are inexpensive, the mortar and plaster conserve fire-brick walls and arches, the new plaster can be applied instead of relaying brick, and fuel is conserved by the prevention of air infiltration through cracks.

W. H. B. (C. A.)

The study of refractory products. II. P. DEMASURE. *Bull. fed. ind. chim. Belg.*, **3**, 238-56(Mar., 1924); cf. *C. A.*, **18**, 1887.—A review and discussion of the strength of various refractories, particularly at high temps., and description of an app. for measuring their compressive strength at temps. up to 1500°.

WM. B. P. (C. A.)

PATENTS

Refractory article and method of making the same. CLARENCE J. BROCKBANK. U. S. 1,503,150, July 29, 1924. A refrac. article of graphite and clay vitrified in an atmosphere of hydrocarbon gas and characterized by relatively increased hardness at high temp. and relatively increased refrac. properties.

Checker brick. JOSEPH HOGBIN and WILLIAM LEHMAN. U. S. 1,500,455, July 8, 1924. In a checker structure, a plurality of parallel supporting walls, and cross members rockably supported in spaced relation between said walls.

Refractory materials for lining furnaces, etc. J. HODSON. Brit. 211,944, Nov. 28, 1922. Bricks, furnace linings, retorts or similar products are formed from rocks contg. MgCO_3 and CaCO_3 together with either (a) talc or other form of Mg silicate, (b) igneous rocks with or without basic Fe cores, or either a or b plus silica sand; *e. g.*, SiO_2 15, serpentine 5, raw dolomite 10 and burnt dolomite 70%. The materials may be molded with or without a glutinous binder and then burnt or may be burnt to a plastic state and then molded. Raw magnesite 92.5, SiO_2 sand 5 and clay 2.5% also may be used.

(C. A.)

Terra Cotta

Tile and terra-cotta block. WILLIAM HENRY GRUEBY. U. S. 1,501,709, July 15, 1924. A tile block having an outer substantially flat facing side and an inner surface pro-



vided with inwardly extending projections at the middle portion and at opposite ends, the middle projection having a vertically disposed recess of suitable dimensions wholly within the same and the end projections having recesses of a portion of the area of the recess of the middle projection, whereby when stacked two of the end recesses will register with a middle recess to form continuous channels.

White Wares

Black and grey flint. A. HEATH AND A. LEESE. *Trans. Ceram. Soc. (Eng.)*, **22**, 313-6(1922-23).—Flint was suspected as the cause of a form of stunting known as "chittering" which does not always appear immediately after the ware is drawn from the glost oven, but is liable to occur subsequently to decoration or even in the ware-house. Black flint and grey flint were therefore calcined at the same temp., and plates of standard earthenware made with each, and fired, biscuit and glost, in the same sagger. After standing a few weeks, the bodies made with grey flint were found to be more liable to chittering than those made with black flint. The sp. gr. of the flints were: grey 2.471, black 2.467. They were ground to 160 mesh, with approx. 1% residue. In the discussion A. G. Richardson said chittering was due to four faults: (1) grey flint, (2) overground flint, (3) excess of flint, (4) displacing hard purple stone by mild stone.

H. H. S.

Chemical stoneware and its applications. M. A. KNIGHT. *Chem. Met. Eng.*, **28**, 689(1923).—Chem. stoneware is a hand-molded product easily available for special shapes. It is usable in every industry where corrosive liquids are found.

W. H. B. (C. A.)

BOOK

BENISCHKE, GUSTAV: *Die Porzellan-Isolatoren*. 2nd revised ed. Berlin: J. Springer. 116 pp.

(C. A.)

Equipment and Apparatus

Notes on the Proctor drier. A. H. MIDDLETON. *Trans. Cer. Soc. (Eng.)*, 51-60.—Describes an English installation of this drier used for drying brick, coke oven shapes and gas retort segments, varying in wt. from 2 lbs. up to 230 lbs. each.

H. F. S.

Improvements in drying refractories or other goods. J. HOLLAND AND W. J. GARDNER. *Trans. Cer. Soc. (Eng.)*, **23**, 16-25.—Describes a continuous tunnel drier for silica brick. The tunnel is 3 ft. wide and 60 ft. long and quite shallow. A fire box is built under one end of the tunnel and the flue from this runs under the floor of the tunnel to near the other end and then into a stack. The floor and side walls are made of refrac. slabs. At the rear (cold) end of tunnel is a cooling chamber which is cut off from the drying chamber by a damper or door. The bricks to be dried are placed *only one high* on wrought iron plates at the furnace end of the drier. These plates are attached one to the other and drawn through the drier on rollers by suitable mech. means. The moisture is drawn out by a stack at the hot end of the drier. A two tunnel drier will dry 5000 silica brick in 9 hrs. with a temp. of 100°C at the center of the drier above the brick, using 400 lbs. of coal. One man takes this number of bricks from the drier and returns the drier plates to the feed end.

H. F. S.

Collecting flint dust. A. E. HARRIS. *Trans. Cer. Soc. (Eng.)*, **23**, 26-38.—Discusses dust collection app. in general and describes in particular a typical suction filter dust collector.

H. F. S.

Note on the abrasion of fire clay materials. W. C. HANCOCK AND W. E. KING. *Trans. Ceram. Soc. (Eng.)*, **22**, 317-22(1922-23).—The methods in use for detg. abrasion, viz., the Bauschinger grinding mach., the "wearing" (sand-blast) test, and the "rattler" test, cause abrasion not by direct rubbing but rather by grinding, and further, expts. can only be carried out within a strictly limited range of temp. The authors used a

long metal arm, jointed in the middle, one end of which was attached to an eccentric driven by an elec. motor. The other end was fitted with a small metal clamp to hold the test-piece, which was moved backwards and forwards over the surface of a fixed block which might be of the same or different mat. so that really the mutual abrasion was detd. The per cent loss of wt. was taken as a measure of abrasion; when very small it may be reckoned as the "loss per 10,000 strokes." Detns. were not begun until after the first hour of abrasion. The conclusions are: (1) Fine-grained bricks resist abrasion more than coarse-grained, and admixt. of grog, both as regards size of grain and quantity, decreases resistance; (2) Abrasion increases at higher temps; (3) Hard-firing of bricks decreases abrasion; (4) Addition of load to wearing surfaces increases abrasion.

H. H. S.

Humidity recorders. E. B. WHEELER. *Bell System Tech. Jour.*, 3 [2], 238-59 (1924).—An account is given of a recording hygrometer consisting of a ventilated psychrometer (wet and dry bulb thermometer) together with a Leeds and Northrup potentiometer recorder, resistance thermometers, a double wheatstone bridge circuit and the necessary wind tunnel equipment. As the chief difficulty encountered in the use of the wet bulb thermometer has been the gradual clogging and drying up of the cotton wick, special pains must be taken to remove all traces of grease from the wick at the start and to keep dust out of the distilled water. Charts and data are given showing comparison of results obtained in the laboratory with the recorder and with a ventilated psychrometer equipped with accurate mercury thermometers. Very satisfactory agreement was obtained over a range of relative humidities from 54 to 97%. Interesting figures are given showing indoor and outdoor temps. and relative humidities, from which it appears that the humidity indoors may be kept below that of the outside air by closing the windows during sudden changes (storms), and by the application of ht. This is important in telephone exchanges, where the elec. equipment is sensitive to humidity. Finally a modification of the recording hygrometer is described, which registers relative humidity directly. In this app. a Leeds and Northrup recorder with two pens is employed, one for registering dry bulb temps. and the other for relative humidity. While both instruments are said to be practical for general use, the author emphasizes the need of intelligent care and skill in maintenance of the app. A. F. G.

The use of conveyors in chemical works. HARTLAND SEYMOUR. *Chem. Age* (London), 9, 565-6 (1923).—Conveyors may be classed as continuous and pneumatic. Continuous conveyors carry the material on a continuous band, have push plates, scrapers, pans, slats, or buckets bolted to an endless chain, or are constructed on the principle of a spiral rotating in a trough. The pneumatic conveyor is gaining in favor. It has even been used successfully in handling atomized lead, weighing 450 lbs. (19.6 kg.) per cu. ft. (0.028 cu. m.).

W. H. B. (C. A.)

The power-load curves of ball mills. A. O. GATES. *Eng. Mining J.-Press*, 113, 485-7 (1922).—A simple lab. app. for exptl. work on power-load curves is described. The power varies directly with the charge up to half load, reaching a max. at 60-75% of the mill capacity. A curve is shown for a cylindrical mill at various speeds and loads. Power in ball mills is consumed as (a) friction losses in bearings, and (b) energy spent upon the free balls or pebbles within the mill and by them spent upon the ore, or other pebbles, or in the lining, or returned to the mill. The friction load is practically const. for all loads at const. speed. The h. p. developed by the mill in raising the balls equals $r^{5/2} \times \text{const.}$, when r = radius of mill.

W. H. B. (C. A.)

Route your materials via air line. F. L. JORGENSEN. *Chem. Met. Eng.*, 28, 932-8 (1923).—A study of pressure and vacuum systems of pneumatic conveyance. Each may be classified as low, medium, and high. Layouts are shown for a high-vacuum conveying system, and a system with dust filtration; also for handling fertilizer, lithopone Pb and bauxite.

W. H. B. (C. A.)

Kilns, Furnaces, Fuels and Combustion

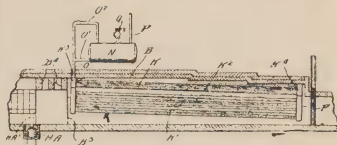
Smaller furnaces for pulverized coal. OLLISON CRAIG. *Power*, 60 [4], 145 (1924).—One of the handicaps of the use of powdered coal is the necessity of large fur. Work on small fur. will require speeding up of the rate of combustion of the coal; this in turn will mean higher fur. temp. with refrac. capable of withstanding them. A fur. has been constructed where extensive research and exptl. work can be done. A portion of the fur. is lined with special refractory brick and a portion with standard fire brick for purposes of comparison. A unit powdered coal machine has been installed to supply the coal. C. J. H.

Traveling grates, changing fuels, and self-cleaning. PRADEL. *Wärme & Kälte Tech.*, 26, 81-3(1924).—P. describes and illustrates rather imperfectly a new type of traveling grate, in which the links or sections are easily renewable, and which does not become clogged with clinker. E. W. T. (C. A.)

PATENTS

Tunnel kiln for burning porcelain, bricks, tiles, lime or other materials. N. LINGERSDORFF. Brit. 211,894, Feb. 26, 1923. The kiln is heated by oil or gas burners. (C. A.)

Tunnel kiln with steam-generating cooling zone. CONRAD DRESSLER. U. S. 1,503,750, Aug. 5, 1924. In a tunnel kiln in which the kiln chamber comprises a heating zone and a cooling zone successively transversed by the goods passing through the kiln, the improvement which consists in a steam generating unit comprising water heating elements located in the kiln chamber in position to abstract heat from the goods as the latter pass through said cooling zone.



Vertical kiln adapted for drying clay, gypsum, etc. A. BIGOT. U. S. 1,497,084, June 10. (C. A.)

Geology

Clay mine reopened. ANON. *Chem. Age*, 9, 15(1924).—Clay deposit at Bennington, Vt. has been reopened and is being operated by the Vermont Kaolin Corp. 50,000 T. had been removed from it since 1865 when opened by Lafayette Lyons. Was used as enameling clay, china clay, crude fire clay, and paper coating. Is equal in quality to English clays. Has been closed since 1909. The mine is 65 ft. deep and the seam is like a damp chalk containing fine silica sand. It is made up into sludge and coarse sand settles out while the finer is removed by a hydraulic bowl classifier to 350-mesh size. The refined kaolin is discharged and sent to the rotary drier. It is expected to produce 6000 tons per year with 20 men employed. S. S. C.

Petroleum possibilities of western Oregon. WARREN DE PRE SMITH. *Econ. Geol.*, 19 [5], 455-65(1924).—Describes drilling in various sections of Ore., and cites results to show that, except in the Ashland district, where oil shales are found, the results are all negative. From present indications, W. Ore. is a territory of possible but not probable petroleum reserve. C. W. O.

Types of magnesite deposits and their origin. GEORGE W. BAIN. *Econ. Geol.*, 19 [5], 410-33(1924).—Magnesite deposits that are being or have been worked can be divided into four types: (1) magnesite as a sedimentary rock; (2) magnesite as an alteration of serpentine; (3) magnesite as a vein filling; (4) magnesite as a replacement of limestone. Of these only the 2nd and 4th are of economic importance at the present time. The most important and complex is that which has been termed the replacement type. Deposits of the replacement type in at least two cases are normal limestones replaced by magnesia-bearing soln. emanating from granite magma. A similar origin seems to apply to the lesser known Washington occurrence. The solns. were

in the form of silicates when they reached the limestones. The sol. at a certain stage pptd. out as serpentine and talc, rather than as anhydrous minerals as is usually believed to be the case. Almost simultaneously any anhydrous minerals already formed became hydrated. Reaction between the limestones and dolomites and the silicate-bearing soln. formed magnesite or dolomite, depending upon whether the rock traversed by the soln. was a dolomite or a limestone. The wollastonite formed during the reaction was carried away in soln. as in the case of the silica in the formation of the magnesite veins in the better known deposits in serpentine. The sedimentary deposits seem to be formed in salt lakes chiefly by pptn. of the less sol. MgCO_3 formed by chemical reaction but probably helped by evapn. The vein deposits constitute a variety of the ordinary fissure vein deposits of magmatic origin. Deposits in serpentine are due to the alteration of serpentine by carbonated waters, seeming, in most cases, to be of magmatic origin. Transportation and selective pptn. are an important feature in forming workable deposits. Magnesite from deposits of sedimentary origin or from deposits in serpentine is usually very uniform and free from objectionable constituents. Magnesite from fissure veins is very ferruginous, due to the presence of FeCO_3 . Magnesite from replacement deposits is variable and requires careful sampling. The quality of a shipment is the quality of the poorest piece in it. C. W. O.

Note on andalusite from California: a new use and some thermal properties. A. B. PECK. *Am. Mineral.*, 9, 123-9(1924).—A com. deposit of andalusite occurs on White Mt., Inyo Range, Mono Co., Calif. The andalusite rock is coarse granular, compact and gray to light pinkish brown. Coarse crystals occur in cavities, having the forms *k* (210) and *r* (101). The material as mined runs 75-85% andalusite, but owing to the presence of corundum chem. analysis shows about 90% Al_2O_3 . Associated minerals are: lazulite, pyrophyllite, muscovite, deep blue corundum, microscopic inclusions of rutile, and less abundant pyrite, barite, lazurite in quartz veins, and quartz in veins traversing the mass, never in the mass itself. About 70 tons per week are mined for use in the manuf. of spark plugs, where a high content of "artificial sillimanite" is desirable. During the burning of the clay-andalusite mixt. all the andalusite is converted into "artificial sillimanite," $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ (mullite preceding abstract) with an excess of highly siliceous glass. The inversion occurs at about Seger cone 13. At that temp. the andalusite grains change to groups of parallel fibrous crystals of "artificial sillimanite" with narrow strips of glass between. Cyanite goes over to interlocking fibers and glass at cone 11. E. F. H. (C. A.)

An unusual occurrence of cyanite. R. C. WALLACE. *Am. Mineral.*, 9, 129-35 (1924).—Reddish cyanite occurs in a sedimentary schist series near a granite contact at Anderson Lake, in the Reed-Wekusko map-area of northern Manitoba. Associated minerals are quartz, micas, chlorite, garnet and staurolite. Conditions favorable to the formation of cyanite would appear to be: excess of Al_2O_3 , low alk. and alkali earth content and high temp. The stability of the cyanite here seems to be conditioned by the nearby igneous contact. E. F. H. (C. A.)

Geologic literature on North America, 1785-1918. I. Bibliography. J. M. NICKLES. U. S. Geol. Survey, *Bull.* 746, 1167 pp.(1923).—Includes articles of chem. interest. L. W. R. (C. A.)

Feldspar in 1922. F. J. KATZ. U. S. Geol. Survey, *Mineral Resources of U. S.*, 1922, Part II, 251-9(Preprint No. 27, published Mar. 6, 1924). E. H. (C. A.)

Chemistry and Physics

Technology of zirconium and its compounds. F. C. NONAMAKER. *Chem. Met. Eng.*, 31, 151-5(1924).—A review of the methods of preparation of the element and its oxide from the ore, and its application in the metallurgical and ceram. industries. M. E. M.

The zenith temperature. J. W. MELLOR. *Trans. Cer. Soc. (English)*, **23**, 13.—Assuming that known phys. laws hold good at excessively high temps. the highest possible temp. is something less than 4 million million deg. abs., or 4,000,000,000,000°C.

H. F. S.

The physical properties of clay. S. E. ACKERMANN. *Trans. Ceram. Soc. (Eng.)*, **22**, 333-43(1922-23).—A London clay of anal.: SiO_2 57%, Al_2O_3 19, Fe_2O_3 5, CaO 4, H_2O combd. 9, and sundries 6, was tested for penetration by weighted piles. Three sets of expts. were: (a) Square pyramids forced in, point downwards; (b) piles of various cross-section, some pointed, and some square or blunt-ended; (c) discs. A close relationship was found between the law of penetration into clay and into metals. Thus with pyramids of square side b mm. long, $b = 2.22E^{1/4}$ in clay contg. 30% water (the vertex angle of pyramid being $37\frac{1}{2}^\circ$); and with tin Edwards and Willis found $d = 2.186 E^{1/4}$ where d was the diam. in mm. of indentation caused by a 10 mm. diam. ball; E in the clay formula being the work done in cm. kilos, and, in the tin formula, the energy of the blow in lb.-ins. The connection between the *tensile strength* of London clay and its water content is given as:

| | Grains per sq. cm. |
|-----------|--------------------|
| 28% water | 80 |
| 26 | 140 |
| 24.5 | 200 |
| 23 | 300 |
| 5 | 13,150 |

the percentage of water being calculated from the loss on drying for 2 days at 180°F . Expts. on the *torsional elasticity* of a rolled cylinder 68 cms. long of clay contg. 28% water showed that the lower end could be twisted through an angle of 32° and on release would return instantly to zero. This could be repeated several times, but if the twist was more than 32° the permanent set was equal to the excess of twist over 32° . The *breaking load* of a clay cylinder 23 mm. diam. and 25 cm. long, dried at 180°F ., and loaded at the center, was 14.87 kilos. *Shearing tests* showed that coeff. of friction of clay is not constant at the same percentage of water, but varies inversely as the sq. root of the pressure between the surfaces, $\mu = \frac{9.47}{\sqrt{p}}$ at 25% water. When a

cylindrical pile is driven into clay, 80% of the load is supported by side friction and only 20% by vertical pressure. *Pressure of fluidity*, obtained by dividing the critical load by the area of the disc, is connected with the tensile and shearing strengths ($p = 3.68C + 5.21f$) and as these are factors of *plasticity*, it is suggested that press. of fluidity which is easily detd. be used for comparing plasticity of diff. clays, or of the same clay with diff. per cent water. The *extrusion* of clay through circular orifices showed that on doubling the area of orifice the discharge of clay is quadrupled, clay thereby differing from water.

H. H. S.

The outlook in chemistry. W. J. POPE. *J. Soc. Chem. Ind.*, **43**, 566-71(1924).—(Trueman Wood Lecture to Roy. Soc. of Arts.) The sudden development of physics during the last 20 years has unified chem. and physics. What were theories or mere hypotheses are now actual statements of fact. During the next few years we may expect to learn the cause of the great stability of the benzene ring, the basic principle underlying tautomerism, the origin of color in quinones, and why copper, of atomic number 29, refuses to form organo-metallic compds., while Zn, Ga, Ge, As, Se, Br, of at. numbers 30-35 all combine with methyl radicles. A quantitative explanation of the energy changes of chem. reactions, an exposure of the mechanism attending chem. changes and particularly catalytic reactions, should be forthcoming. The importance of catalysis in bio-chemistry cannot be exaggerated. Research by team work is stressed.

Instead of Ehrlich's 606 for syphilis, and Baeyer's 205 for sleeping sickness, scores of thousands of chem. subs. should be systematically studied for all diseases. The Natl. Phys. Lab. is initiating a systematic investigation of alloys by studying the alloys of pure Fe and Cr.

H. H. S.

Chromates of thorium and the rare earths. H. T. S. BRITTON. *J. Soc. Chem. Ind.*, **43**, 485(1924).—La, Pr, Nd, and Sa, form isomorphous yellow chromates of the general formula $M \frac{11}{2}(\text{CrO}_4)_3, 8\text{H}_2\text{O}$. Variations in soly. allow of fractional pptn. with K_2CrO_4 . The tendency to form sparingly sol. double chromates is marked in the cases of La, Pr, and Sa.

H. H. S.

The behavior of clays, bauxites, etc. on heating. II. H. S. HOULDSWORTH AND J. W. COBB. *Trans. Ceram. Soc. (Eng.)*, **22**, 344-8(1922-23).—The earlier work (reference p. 48, 1924) showed that the shrinkage of clays on heating is not continuous, but occurs in well-defined stages, in kaolin notably at 530°, 880°, 950°, and 1050°. The present work deals with porosity, sp. gr., and refractive index. Sp. gr. of kaolin is 2.642 at 110° and 400°; it then decreases to 2.510 at 500° and increases to 2.688 at 1000° the largest increase being between 850° and 950°. Porosity is 46.9% at 110° and 400°; it increases to 48.5% at 450° and slowly to 51.3% at 1000°. Refractive index is 1.564 at 110° and 400°, decreases to 1.516 at 550°, is 1.522 at 600° and 1.518 at 650°, and then increases to 1.549 at 1000°. This work shows that definite changes in the kaolinite mol. occur at 450°, 880°, and 950°, with minor changes at 625°, 680°, and 760°. Density and refractive index reach their min. with complete dehydration.

H. H. S.

On the behaviour of kaolin on heating. W. J. VERNADSKY. *Trans. Ceram. Soc. (Eng.)*, **22**, 398-401(1922-23).—Houldsworth and Cobb's work (preceding abstract) is attacked on the ground that the kaolin used was impure. Mellor's theory that kaolin on heating gives free SiO_2 and Al_2O_3 is not accepted. The mineral group kaolin, feldspar, mica, leucite, etc., contains a complex nucleus $\text{Al}_2\text{Si}_2\text{O}_7$ which remains unchanged during the various transformns., one into another, which these minerals are constantly undergoing. The only case where this linkage between Al and Si atoms is broken at a low temp. is in the formn. of laterite, which occurs under peculiar conditions and is analogous to a biochem. process. V. supposes that at 420-530°C kaolin forms an anhydride $\text{Al}_2\text{Si}_2\text{O}_7$, leverrierite. At higher temps. the critical point on the heat curves corresponds to polymorphic changes in $\text{Al}_2\text{Si}_2\text{O}_7$. Le Chatelier's exothermic reaction at 930-950° corresponds to the destruction of the nucleus and the setting free of mols. of SiO_2 . In a footnote to this paper, Mellor says his work has been confirmed by Tammern and Pope (*Z. anorg. Chem.*, **127**, 43(1923)) and by Satoh (*Sci. Rep. Tohoku Univ.*, **1** [3], 157(1923)).

H. H. S.

Isotopes. ANON. *J. Soc. Chem. Ind.*, **43**, 636-7(1924).—The following is a list of the isotopes now known:

| Element | At. number | At. weight | Masses of isotopes in order of intensity of spectral lines |
|---------|------------|------------|--|
| H | 1 | 1.008 | 1.008 |
| He | 2 | 4 | 4 |
| Li | 3 | 6.94 | 7, 6 |
| Be | 4 | 9.1 | 9 |
| B | 5 | 10.9 | 11, 10 |
| C | 6 | 12.005 | 12 |
| N | 7 | 14.008 | 14 |
| O | 8 | 16 | 16 |
| F | 9 | 19 | 19 |
| Ne | 10 | 20.2 | 20, 22 |
| Na | 11 | 23 | 23 |

| | | | |
|----------------|----|--------|---|
| Mg | 12 | 24.32 | 24, 25, 26 |
| Al | 13 | 27 | 27 |
| Si | 14 | 28.1 | 28, 29 (30) |
| P | 15 | 31.04 | 31 |
| S | 16 | 32.06 | 32 |
| Cl | 17 | 35.46 | 35, 37 |
| A | 18 | 39.9 | 40, 36 |
| K | 19 | 39.1 | 39, 41 |
| Ca | 20 | 40.07 | 40 (44) |
| Sc | 21 | 45.1 | 45 |
| Ti | 22 | 48.1 | 48 |
| V | 23 | 51 | 51 |
| Cr | 24 | 52 | 52 |
| Mn | 25 | 54.93 | 55 |
| Fe | 26 | 55.84 | 56, 54 |
| Co | 27 | 58.97 | 59 |
| Ni | 28 | 58.68 | 58, 60 |
| Cu | 29 | 63.57 | 63, 65 |
| Zn | 30 | 65.37 | 64, 66, 68, 70 |
| Ga | 31 | 70.1 | 69, 71 |
| Ge | 32 | 72.5 | 74, 72, 70 |
| As | 33 | 74.96 | 75 |
| Se | 34 | 79.2 | 80, 78, 76, 82, 77, 74 |
| Br | 35 | 79.92 | 79, 81 |
| Kr | 36 | 82.92 | 84, 86, 82, 83, 80, 78 |
| Rb | 37 | 85.45 | 85, 87 |
| Sr | 38 | 87.63 | 88, 86 |
| Y | 39 | 89.33 | 89 |
| Ag | 47 | 107.88 | 107, 109 |
| In | 49 | 114.8 | 115 |
| Sn | 50 | 118.7 | 120, 118, 116, 124, 119, 117, 122 (121) |
| Sb | 51 | 121.77 | 121, 123 |
| I | 53 | 126.92 | 127 |
| X _e | 54 | 130.2 | 129, 132, 131, 134, 136, 128, 130 (126)(124) |
| Cs | 55 | 132.81 | 133 |
| Ba | 56 | 137.37 | 138 |
| La | 57 | 138.9 | 139 |
| Pr | 59 | 140.9 | 141 |
| Nd | 60 | 144.3 | 142-150 |
| Er | 68 | 167.7 | 164-170 |
| Hg | 80 | 200.6 | (197-200), 202, 204 |

H. H. S.

Clay

The structure of Si. H. COLLINS. *Chem. News*, **129**, 47(July 25, 1924).—The structure studied and proved to be $\text{Na}-\text{H}-\text{H}_3-\text{H}$ where / are electro-positive forces and # are electro-negative forces. H_3-H is non-metallic and $\text{Na}-\text{H}$ is metallic. This

was further proven by tests using the Law of Relative Vol. and Heat Formation. 13.02 was found to be the commonest vol. of Si. S. S. C.

The volumetric estimation of vanadium in steel. A. T. ETHERIDGE. *Analyst*, **48**, 588-90(1923); *S. u. Eisen*, **44**, 644(1924).—Diphenylcarbazide is used as indicator in titration with FeSO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$. H. H. S.

Devitrification phenomena. H. KNOBLAUCH. *Sprechsaal*, **57**, 234-40(1924); *J. S. C. I.*, **43B**, 558-9(1924). H. H. S.

Electromotive characteristics of glasses. H. SCHILLER. *Ann. Physik*, **74**, 105-35 (1924). H. H. S.

Behavior of gases in contact with glass surfaces. D. H. BANGHAM AND F. P. BURT. *Proc. Roy. Soc.*, **105A**, 481-8(1924); *J. S. C. I.*, **43B**, 468(1924). H. H. S.

Color reaction between cobalt salts and dimethylglyoxime in presence of sulphides. F. FEIGL AND L. V. TUSTANOWSKA. *Ber.*, **57**, 762-3(1924); *J. S. C. I.*, **43B**, 580(1924).—After oxime pptn. of Ni, add Na_2S to filtrate. Violet shows Co. Delicate to 1 in 830,000. H. H. S.

Delicate test for zirconium in presence of titanium. L. BELLUCCI AND G. SAVOIA. *Atti. I Congr. Natl. Chem. pur. appl.*, 483-8(1923); *J. S. C. I.*, **43B**, 580(1924).—By nitroso-naphthol. H. H. S.

What is the simplest way of calculating pycnometer density determinations. R. SAAR. *Chem.-Ztg.*, **48**, 285-6(1924).—Rapidity in calcn. can be gained by utilizing the fact that many of the figures used may be expressed as a whole number \pm a small difference. An example will make the method clear: wt. pycnometer full of subst. = 71.564 g.; wt. pycnometer full of H_2O = 70.996 g.; difference = 0.568 g.; wt. of H_2O in pycnometer = 49.925; d. = $1 + (0.568/49.925)$; $0.568/49.925 = 0.568 \times (1/49.925) = 0.568 [2 \times 0.49925 + 0.00150]/49.925 = 0.568 \times (0.02 + 0.00003) = 0.01136 + 0.00002 = 0.0114$. Hence d. = 1.0114. Simple equations can be used for converting ds. at one temp. to ds. at another. W. H. B. (C. A.)

Graphite as a metallic modification of carbon. EUGEN RISHKEVICH. *Chem.-Ztg.*, **48**, 101(1924).—The metallic character of an element is conditioned by the presence of free electrons which make possible the conduction of electricity without simultaneous electrolysis of the conducting medium, the carrying of heat, non-transparency and metallic luster, and the easy transformation into ions with positive charges. Judged by these standards it is shown that graphite may be considered as a metal. W. C. E. (C. A.)

The preparation of persilicates. A. H. ERDENBRECHER. *Chem.-Ztg.*, **48**, 310-11 (1924).—82% H_2O_2 added to Na_2SiO_3 yielded a solid substance with an O content of 15.5%; the material could be isolated and identified by microchem. means. Similarly 82% H_2O_2 with $\text{Na}_2\text{SiO}_3 \cdot 4\text{H}_2\text{O}$, $\text{Na}_2\text{SiO}_3 \cdot 6\text{H}_2\text{O}$, and $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$ gave solid reaction products, and showed but slight development of heat—unlike the reaction with Na_2SiO_3 . Thus, 1 g. $\text{Na}_2\text{SiO}_3 \cdot 6\text{H}_2\text{O}$ and 0.3 cc. 82% H_2O_2 gave a foamy mass which, when rubbed with alc., yielded a brittle solid of the compn. Na_2O 26.08%, SiO_2 26.60%, H_2O 34.41% and O 12.90%. W. C. E. (C. A.)

The micro-volumetric determination of arsenic, antimony and tin. A. BRUKL. *Mikrochemie*, **1**, 54-7(1923).—By using $\text{N}/500 \text{ I}_2$ soln. it was found possible to titrate from 0.02 to 1.04 mg. of As within 0.004 mg. of the truth. To obtain this accuracy, it is necessary to add I_2 to the starch indicator so that it is turned blue and to finish the titration at the same tint. Similar results were obtained in the iodometric titration of from 0.08 to 0.84 mg. of Sb. For the titration of Fe^{+++} satisfactory results were obtained with 0.0045-0.51 mg. Fe, TiCl_3 soln. kept out of contact with air being used. Automatic micro-burets were used. W. T. H. (C. A.)

Flameless surface combustion. J. Ex. *Het Gas*, **43**, 355-9(1923).—An historical review, dealing especially with the investigation of W. A. Bone. Application. *Ibid.*,

424-8(1924).—Referring to his previous article Ex describes the first surface burner by Bone, consisting of a diaphragm through which the mixt. of gas and air was blown. Later constructors used grains of fireproof material, heaped up irregularly, instead of the diaphragm. Various designs, especially those of the American Surface Combustion Co., are described. Theoretical considerations. *Ibid.*, **44**, 8-17.—Surface combustion is not a catalytical chem. process since the kind of the surface is of little or no influence, but is primarily detd. by phys. phenomena, *viz.*: *increased propagation velocity of the wave of combustion along the surface*, larger heat capacity of the porous material, and the very intense mixing of the gases before and after combustion in the capillary cavities. These factors cause the low temp. of the flue gases, *viz.*, the great heat efficiency in Bone-Schnabel boilers and other surface combustion heated machines.

R. B. (C. A.)

Analysis of products rich in alumina. H. HILLER. *Z. angew. Chem.*, **37**, 255-6 (1924).—In the analysis of products such as corundum fusion with borax is more satisfactory than fusion with either soda or alkali pyrosulfate. Melt granular borax in a Pt crucible until a layer 5-6 mm. thick is obtained. Cool, and weigh 0.5 g. of sample into the crucible contg. the borax. Fuse slowly, cool and dissolve the melt in dil. HCl. The further progress of the analysis is normal.

W. T. H. (C. A.)

BOOKS

A Dictionary of Applied Chemistry. E. THORPE. Vol. V. Oxygen-Rye. Revised and enlarged edition. Pp. viii + 722. London: Longmans, Green & Co., 1924. Price 60 s. Net.

H. H. S.

Colloid Chemistry. THE SVEDBERG. New York: The Chemical Catalog Co. 1924. Pp. 265.—This book is in the true line of scientific authorship. Instead of retailing second- and third-hand references from other volumes, it describes the author's researches at Upsala, and discusses the work of other people in the light of his own experience. The sections are: (I) Formation of the Colloid Particle, (II) The Colloid Particle as a Molecular Kinetic Unit, (III) The Colloid particle as a Micell, a micell being defined as the particle together with its surrounding or adsorbed molecules and ions and probably a part of the surrounding liquid or gas.

H. H. S.

Lehrbuch der Metallographie, Chemie u. Physik der Metalle u. ihrer Legierungen. G. TAMMANN. 3d Ed. Leipzig: Leopold Voss, 1923. xviii + 450 pp., 249 figs. M. 14.50.

H. H. S.

An Account of the Achievement, and the Present State of Knowledge in Chemical Science. London: E. BENN. 1924. viii + 281 pp. Price 15 s. Twenty-four essays written by experts in each selected branch of chemistry.

H. H. S.

Reports of the Progress on Applied Chemistry. Vol. 8. London: Soc. of Chem. Indus. Price 12 s.—Contains section on glass, and one on ceramics, building mat. and refrac.

H. H. S.

PATENTS

Removal of brown coloration in china clays. L. A. HOLDEN. Eng. pat. 214,699, Jan. 19, 1923; *J. S. C. I.*, **43B**, 514(1924).

H. H. S.

Manufacture of red oxide of iron. DANIEL TYRER. U. S. 1,501,873, July 15. A method of manufacturing red oxide of iron, which consists in mixing ferrous chloride with hydrated ferric oxide in a very fine state of subdivision and passing a mixture of air and water vapor over this product at a temperature of 250° to 300°C.

Process of making lead nitrate and hydrated manganese dioxide. ERIC HJALMAR WESTLING. U. S. 1,502,079, July 22. The process of producing hydrated manganese dioxide and lead nitrate which comprises reacting manganese nitrate with lead peroxide.

General

The X-ray analysis of coal, and a new X-ray examining unit. C. N. KEMP. *J. Soc. Chem. Ind.*, **43**, 234 T-235 T(1924).—X-ray methods applicable to coal resolve into three groups: (1) Bombardment by rays of known penetrating power and intensity, and observn. of modifications effected. (2) Examn. by radiosopic, sterioradioscopic, radiographic, stereoradiographic, and radiodensimetric methods of the nature and distribn. of extraneous matter in coal, based in each case on the varying absorpn. of the rays, and detd. visually, photographically, or by ionization methods. (3) Examn. of the elementary cryst. constituents by X-ray diffraction. The examg. unit consists of a steel tank provided with an insulating lid and contg. a transformer (65,000 volts) with a Coolidge tube of the radiator type clamped above it, so that the cone of rays from the target of the tube is projected vertically upward, through a glass or Al window. The tank is filled with special oil to immerse both transformer and tube. For safeguards in dealing with the rays after emergence, consult recommendations of X-Ray and Radium Committee, and Radiolog. Section of (Eng.) Natl. Phys. Lab.

H. H. S.

The French ceramic congress. ANON. *J. Soc. Chem. Ind.*, **43**, 721(1924).—Held in Paris, June 2-6. Frion and Linke described two years' tests at Sevres of crude oil and tar as liquid fuel for kilns. One kg. of crude oil replaces 7 kg. of wood, a ht. economy of over 50%. The time of burning was reduced from 24 to 11 hrs. Natural and artificial draughts were discussed. Cazeneuve dealt with discontinuous or cellular driers as compared with continuous driers.

H. H. S.

Chemical engineers. A joint conference of the Amer. Institute of Chemical Engineers and the British Institution of Chemical Engineers will be held in England in July, 1925.

H. H. S.

Comparison of types of fireproof construction. CHESTER L. POST. *Jour. W. Soc. Engrs.*, **29** [5], 278-89(1924).—A discussion of types of fireproof construction based on the requirements of the Chicago Building Ordinance. The materials considered as filling the conditions of fireproof covering are: (1) burnt brick; (2) tiles of burnt clay; (3) approved cement concrete; (4) terra cotta. A very clear, condensed presentation of mat. and types of construction is given. Of especial interest are the following, together with a statement of the advantage, disadvantage and adaptability of each: segmental tile arches; reinforced concrete joists with hollow clay tile fillers; reinforced concrete joists with gypsum tile fillers; and, flat slab types of construction. Although each building has so many variables in building construction that it is difficult to give definite rules to select immediately the best type of construction, yet with the type of foundation, spacing of columns, clear story heights, live loads and the use of the building detd., the kinds of fireproof construction which should be investigated will be reduced to a very small number.

C. W. O.

Analysis of cost of types of fireproof construction. ARTHUR F. KLEIN. *Jour. W. Soc. Engrs.*, **29** [5], 290-300(1924).—Average costs are given for: (1) a 16-story hotel building, where 4 types of construction are considered, including a steel and hollow tile construction; (2) a light mfg. building, discussing 3 types of construction; and (3) a warehouse, giving cost data on 3 types of construction. The paper deals with the advantages on a purely cost basis and not from a consideration of the best type of construction.

C. W. O.

The First World Power Conference, representing 30 countries was held at the British Empire Exhibition, London on June 30-July 12th. It discussed the potential resources of hydroelectric power, oil and minerals in each country, and the generation and utilization of power.

H. H. S.

The Internat. Union of Pure and Applied Chemistry, held its annual meeting at

Copenhagen, June 26–July 1. The meeting next year will be at Bucharest, Roumania (*J. S. C. I.*, **43**, 718–19(1924)).

H. H. S.

Powdered-coal firing for water-tube boilers and metallurgical furnaces. H. W. HOLLANDS. *Proc. Inst. Mech. Eng.*, **1923**, 1143–51.—The two chief systems in use are: (a) the central system (favored in America) and (b) the unit system (important in France and England). In (a) the fuel is delivered from a central storage bin by cyclone fans. Resulting disadvantages are: (1) high first cost due to grinder, air-separator, screw-conveyor, cycle fans, bins, driers, etc.; (2) size of the plant; (3) danger of explosion of stored powd. coal. In the unit system each boiler or furnace has a pulverizer. This is said to result in low first cost, smaller space, no risk of explosion, and in case of breakdown, only one furnace is affected. Machines of the grinding or crushing type must have coal with a moisture content down to 1%. The machine described can take coal with 8% moisture. Excessive moisture is removed by hot air from the combustion chamber. Power required for operation with 460, 1100, 2700 lbs. coal per hr. is 7.3, 14, 37 h. p., respectively. About 2% of the power developed is used by the pulverizer. Excessively fine crushing results in lowered efficiency. A gravity pocket avoids the use of a magnetic separator. In practice, too high velocity of the coal causes scouring of the brickwork. CO₂ should be kept at 16% or over. The C content of the ash should usually be under 1% and never over 2%. Coal was used successfully with an ash content of 43.7%. Powd. coal is considered as flexible in use as oil or gas. Actual repairs usually come to about 1.5 d. per ton of fuel burnt. Much additional data are tabulated and charted.

C. G. K. (C. A.)

BOOKS

Reference List of Bibliographies: Chemistry, Chemical Technology and Chemical Engineering Published since 1900. Compiled by Julian A. Sohon and W. L. Schaaf. New York: H. W. Wilson Co. 100 pp. \$1.50. Reviewed in *Ind. Eng. Chem.*, **16**, 543(1924).

(C. A.)

HAIBACH, RUDOLPH: **Pottery Decorating.** New York: D. Van Nostrand Co. 2nd ed., revised. 256 pp. \$3.00.

(C. A.)

BOOK REVIEW

English Pottery. Its Development from Early Times to the End of the Eighteenth Century. By BERNARD RACKHAM and HERBERT READ. With an Appendix on the Wrotham Potters by DR. J. W. L. GLAISHER. Illustrated. 141 pp. and 115 plates. New York. Charles Scribner's Sons. \$30.

A beautiful, large-paper book, handsomely printed and made and illustrated with rare beauty. The authors, both of whom are members of the staff of the Victoria and Albert Museum and authorities of high standing on this subject, have made a real contribution historically and critically to the story of the birth and early growth of artistic handicraft in the first of the English-speaking nations. They go back to the very earliest relics of the potter's art in England, in the twelfth century, and



Plate, inscribed "The rose is red, the leaves are green. God save Elizabeth, Our Queen." Dated 1602.

follow its development through 600 years, until the beginning of the industrial era and machine-made wares. Throughout they treat the subject from a critical viewpoint, revealing the development of taste and skill, tracing influences from within and without the country and endeavoring to establish artistic standards for the appraisal of early ceramic products.

The basic principles of criticism which they apply to these early native wares are these: That when the intention is utilitarian any departure from utilitarian form weakens the esthetic appeal; that there must be symmetry of form or some more subtle balance; that to be really good a vessel must possess a certain vitality growing out of its lines and masses and their ability to suggest "movement, rhythm, or harmony, which" they add, "may indeed be the prime cause of esthetic pleasure;" that in its decoration the vessel, whatever its form, should be treated as blank panel and decorated appropriately.



Dish, red earthenware, decorated in white slip under a yellowish glaze. Staffordshire, second half of seventeenth century.



Dish, red earthenware, covered with a dark brown slip and decorated in white and olive, with the subject of the fall. About 1670.

The great Danish authority, Dr. Emil Hanover introduced his survey of English wares with the statement that "English pottery is, at the height of its development, certainly English—from the point of view of material an original and national product—but a product much more of industrial enterprise than of industrial art."* * * Such criticisms as these are hardly just to what some will reckon to be the purest, if not always the most beautiful, work of the English potter. They take too little account of the nature of pottery and of the technique natural to the material of which it is made. Like most other arts, that of the potter had a humble birth in meeting purely utilitarian needs, but from the first it was potentially, no less than painting or sculpture, a means of esthetic self-expression through the work of the hands.

When the Anglo-Saxons came they brought with them the rudiments of the potter's art and to these the Roman occupation added the use of the potter's wheel and some primitive kind of kiln.

The chapter devoted to the Middle Ages and the Tudor times follows the development of pottery through those centuries, with descriptions of many pieces in museums and collections. Next the authors take up the English tradition in English pottery, study the influences from other countries and from within England itself that shaped its development, describe methods and the work of the chief potters through the seventeenth century. After a survey in a long chapter of the influence of foreign work, especially

majolica and delft, the authors arrive at the age of industrialism, which they study at some length, devoting a final chapter to Wedgwood and the Neo-Classical Age. It is the conviction of these authors that English art of all kinds, including that of the potter, has shown a remarkably individual character as compared with that of the Continent. They find no lasting extraneous influence on English pottery until toward the end of Elizabeth's reign, when tin enamel, the distinctive characteristic of majolica, faience and delft, was introduced. At about the same period came from Germany the method of making the semi-vitrified pottery called stoneware. The discussion and description of these two influences and of individual examples of wares produced is full and rather elaborate.

The estimate of Josiah Wedgwood's work and of his influence on the art of pottery in England is notable for the fullness of knowledge on which it is based, its high critical standard and its eminently fair and judicial spirit. The authors say that he "is indisputably the outstanding figure in the history of English pottery," and they consider it "only an accident of time" that his name is always associated with the introduction of classical models. The classical revival was the result of the great archaeological discoveries in the latter part of the eighteenth century, and Wedgwood's mind, they say, was of that inquiring and enterprising stamp which made it inevitable that he should seize upon the possibilities of popular appeal in classical figures and scenes. And he had that gift for organization and for procuring efficiency in production that makes the modern captain of industry. "Wedgwood was the first English potter," say the authors, "to employ the energies of a large part of his factory staff as a regular thing in the making of vases solely for ornament; at the same time he first gave serious attention to increasing the efficiency of his useful articles from a purely utilitarian point of view. To this end he made division of labor and standardization a condition of commercial success in the pottery industry not only of Staffordshire and England, but of the whole world."

The illustrations comprise 207 figures reproduced in 115 page plates, of which twelve are in color. The pottery examples which they picture are treasured pieces in British museums and collections and the wide extent of the studies and knowledge of the authors is indicated by the fact that they have found these pieces in more than a dozen different museums and over twoscore private collections. They illustrate the development of British pottery down through the centuries from the fourteenth to the eighteenth. Many of them are of great beauty and all of them are examples of the reproductive art at its artistic best.

The New York Times, "Book Review," July 20, 1924.



Punch bowl, enameled earthenware, painted in blue, with Chinese landscapes. Inside the Arms of the City of Liverpool and the inscription "Thomas Bootle, Esquire, member of Parliament for Liverpoole, 1724."

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CERAMIC ABSTRACTS

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AMERICAN CERAMIC SOCIETY

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¹The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

Abrasives

Tentative definitions of terms relating to the gypsum industry. ANON. *Proc. A. S. T. M.*, **23** [1], 642-3(1923). E. N. B.

Report of Committee C-11 on gypsum. W. E. EMLEY, *et al.* *Proc. A. S. T. M.*, **23** [1], 231-5(1923).—The amendments recommended to the tentative methods of testing gypsum and gypsum products are listed. Three papers on gypsum are added as appendices. E. N. B.

Volumetric changes of gypsum. J. M. PORTER. *Proc. A. S. T. M.*, **23** [1], 244-53(1923).—The expansion and contraction of various gypsum-sand mixes were exptly. detd. and are displayed in several graphs. It is concluded that the lack of adhesion of a gypsum sand mix on a concrete base is due to a difference in the expansion of the two and not due to chem. reaction between the cement and gypsum. E. N. B.

The fire resistive properties of gypsum. S. H. INGBERG. *Proc. A. S. T. M.*, **23** [1], 254-6(1923).—The vol. changes taking place in gypsum when it is htd. are reviewed and the properties of gypsum as a fire protective covering for columns are discussed. E. N. B.

Report of Committee C-3 on brick. T. R. LAWSON, *et al.* *Proc. A. S. T. M.*, **23** [1], 194-5(1923).—Six types and sizes of paving brick are recognized as standard. No specif. on concrete brick are given, since further exptl. data on their properties are needed. It is recommended that more study be made of the condition of brick, after yrs. of service, obtained from demolished bldgs. E. N. B.

Report of Committee C-4 on clay and cement sewer pipe. R. HERING, *et al.* *Proc. A. S. T. M.*, **23** [1], 196-7(1923).—The subjects receiving the considerations of the sub-committee, and recommendations regarding specif. are given. E. N. B.

Report of Committee C-6 on drain tile. A. MARSTON, *et al.* *Proc. A. S. T. M.*, **23** [1], 198-207(1923).—Abstracts are given of field and lab. tests on drain tile carried out by (1) Iowa Eng. Expt. Sta., (2) Structural Mats. Research Lab. of Lewis Institute, (3) U. S. Bur. of Public Roads, and (4) Engineering Inst. of Canada. The changes recommended in the Standard Specif. for Drain Tile (C-4 (1921)) are also listed. E. N. B.

Report of Committee C-7 on lime. H. C. BERRY, *et al.* *Proc. A. S. T. M.*, **23** [1], 208-13(1923).—The repts. of the 7 sub-committees contg. recommended revisions of specif. are given. E. N. B.

Tentative specifications for hydrated lime for structural purposes. ANON. *Proc. A. S. T. M.*, **23** [1], 620-5(1923).—The requirements cover chem. properties, fineness, const. of vol., tensile strength and plasticity. The methods used in making these tests are described. E. N. B.

Tentative specifications for concrete aggregates. ANON. *Proc. A. S. T. M.*, **23** [1], 626-8(1923).—Requirements are given covering the quality, grading and strength in concrete for both fine and coarse aggregate. E. N. B.

Tentative specifications for gypsum. ANON. *Proc. A. S. T. M.*, **23** [1], 629-31(1923).—Covers (1) mats. and standards, (2) sampling, (3) packing and marking, (4) inspection and rejection. E. N. B.

Tentative specifications for gypsum partition tile or block. ANON. *Proc. A. S. T. M.*, **23** [1], 632-5(1923).—Covers requirements for compn., dimensions, strength, sampling and inspection. E. N. B.

Tentative methods of sampling, inspection, packing and marking of quicklime and lime products. ANON. *Proc. A. S. T. M.*, **23** [1], 636-9(1923). E. N. B.

Hydraulic and puzzolanic cement from volcanic ash and clay-shale of western India. K. A. KNIGHT HALLOWES. *Trans. Min. and Geol. Inst. of India*, **18**, 72-5

(1924).—Results given of exptl. research in the lab. of Geol. Surv. of India. A table shows results obtained from 25 samples. It shows that it is possible to make puzzolanic cements of low tensile strength from the mats. available by mixing the volcanic ash of the island with the lime which has been locally manufd. O. P. R. O.

Cements with high aluminium content. M. J. BILL. *J. four. elec.*, **32**, 13(1923); *J. Inst. Metals*, **30**, 703.—Cements are characterized by slow setting and rapid hardening. By raising the Al content in ordinary lime cement products of the following formulas are obtained: $\text{Al}_2\text{O}_3 \cdot 3\text{CaO}$, $3\text{Al}_2\text{O}_3 \cdot 5\text{CaO}$, $\text{Al}_2\text{O}_3 \cdot \text{CaO}$, $\text{Al}_2\text{O}_3 \cdot 3\text{CaO}$. The first two are of no com. use, the last two are useful; they are obtained by fusion in elec. furnace at 1350° to 1500° . Compn. may vary from 5 to 15% SiO_2 , 35 to 45% Al_2O_3 , 35 to 40% CaO . They are highly resistant to salt water and solns. contg. sulfates. They harden in 7 to 8 hrs. C. L. M. (C. A.)

Water-solubility and hydration of the calcium aluminates. HANS KUHLE AND HEINRICH THÜRING. *Zement*, **13**, 109–11, 243–6(1924).—The set of Ca aluminates is the crystn. from the H_2O phase as in plaster of Paris. The soly. is about that of $\text{Ca}(\text{OH})_2$. Mixes of pure powd. CaO and Al_2O_3 in mol. ratios of 1–1, 3–1, and 5–3 are made into balls and melted from the top with an oxy-acetylene flame, the unmelted shell holding the melt. Pure cryst. subs. result. Digestion of 0.3 g. in 100 cc. H_2O at 20° for 24–192 hrs. in pure H_2O , weak and concd. solns. of $\text{Ca}(\text{OH})_2$ follows. The solns. become turbid after a few hrs.' contact, because of colloid formation. The filtrates are examd. for Ca and Al in the usual way. The three aluminates studied are sol. in H_2O , with decreasing soly. in increasing concn. of lime solns. The dissolved aluminates react with lime solns. producing $\text{Al}(\text{OH})_3$ and hydrous Ca aluminate. The $\text{Al}(\text{OH})_3$ formed by hydrolysis shows as a gel in a few hrs. Microscopic examn. reveals many hexagonal crystals of Ca hydroaluminates forming in solns. poor in Ca. This salt is quite sol., shows weak hydrolysis and contains probably 3 or less CaO to $1\text{Al}_2\text{O}_3$. Small octagonal crystals also appeared in rich CaO mediums, having low soly., strong hydrolysis and consisting probably 4 mol. CaO to $1\text{Al}_2\text{O}_3$. The reaction products depend on the total concn. of reacting subs. and not on the type of original aluminate.

H. F. K. (C. A.)

Determination of the hardness of abrasives. W. MINDT. *Werkstattstechnik*, **17**, No. 12, 360–7(1923); *Physik. Ber.*, **4**, 1092–3.—For uniform feeding of abrasive the grinding action is proportional to the time. The amt. of grinding per unit time, a , depends on the rate of feeding of the abrasive; it rises to a max. and then decreases. The length of life of the material is ascertained by measg. the amt. of substance which it is grinding off in different periods of time. If the amt. of grinding accomplished at time t is designated by A , and the speed of grinding da/dt is put proportional to the

| Material | $G \cdot 10^3$ | $c \cdot 10^5$ | $G \cdot 10^6$ | H_1 | H_2 | H_3 | H_4 | E |
|----------------------|----------------|----------------|----------------|-------|---------|-------|-------|--------|
| Quartz sand | 42 | 64 | 27 | 308 | 175 | 7.0 | ... | 10,300 |
| Corundum (Norton) | 142 | 107 | 152 | 1150 | 1000 | 9.0 | ... | .... |
| Corundum (Dynamidon) | 113 | 139 | 157 | 1150 | 1000 | 9.0 | ... | .... |
| Corundum (emery) | 142 | 114 | 162 | 1150 | 1000 | 9.0 | ... | .... |
| Tungsten carbide | 163 | 106 | 168 | .... | .... | 9.8 | ... | .... |
| "Novo-diamond" | 163 | 106 | 168 | 1150 | 1000 | 9.0 | ... | .... |
| Corubin | 127 | 193 | 246 | 1150 | 1000 | 9.0 | ... | .... |
| Corundum | 142 | 200 | 234 | 1150 | 1000 | 9.0 | ... | .... |
| Volomit 21 | 234 | 138 | 310 | .... | .... | ... | 120 | 1765 |
| Si carbide | 212 | 229 | 485 | .... | .... | 9.8 | ... | .... |
| Diamond | ∞ | ... | 495 | .... | 140,000 | 10.0 | ... | .... |
| Volomit 13 | 296 | 194 | 575 | .... | .... | ... | ... | .... |

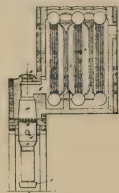
grinding power $A - a$, then $a = A(1 - e^{-ct})$, where c is a proportionality factor. Since the total grinding work is proportional to the square root of the quantity of abrasive applied, S , $A = G\sqrt{S}$, where G is the sp. total grinding work per unit quantity of abrasive. For similar material this grinding power is independent of the size of particle. Apparently the grinding power increases with pressure applied to a limiting value, and then rapidly falls off. The relation between grinding speed, grinding surface, and hardness of the comparison material should be considered. As a measure of hardness either the value G or c would serve, though it is expedient to replace c by Gc , the initial grinding speed per unit quantity. The table gives a résumé of exptl. results. H_1 , H_2 , H_3 and H_4 denote hardness after Auerbach, Rosiwal, Moss and Martens, resp., and E denotes modulus of elasticity. A. E. S. (C. A.)

PATENTS

Process and apparatus for making cement. SPENCER B. NEWBERRY. U. S. 1,504,701, Aug. 12, 1924. In a device of the class described the combination of a vertical kiln having an outlet at the top and a movable grate at the bottom to support the mass in the kiln and regulate and control the discharge of clinker through it, a pipe for supplying air under press. to the space below the grate, a substantially air-tight closure below said grate of funnel shape with a central discharge extension, a pair of spaced valves in said extension and means for feeding mat. contg. carbonaceous combustible matter to said kiln at the top.



Process for burning cement clinkers. SPENCER B. NEWBERRY. U. S. 1,504,702, Aug. 12, 1924. The process of producing cement clinker comprising forming small coherent masses of cement raw mat. and carbonaceous fuel, the constituents of which are so proportioned that the argillaceous matter will be less than that required by an amt. which will be replaced by the ash produced when the combustible constituents are burned, supplying said masses to the upper surface of a laterally enclosed and heat insulated body of predetd. height composed of similar masses, forcing a strong blast of air upwardly through said body to support and cause the combustion of the combustible constituents, and discharging the cement clinker thereby produced at the bottom, agitating the body of mat. during the passage of air for combustion and disintegrating coherent masses of clinker as they are discharged.



Magnesite cement. B. BAKEWELL. Brit. 214,369, Feb. 6, 1923. A cement which does not corrode Fe is made by adding FeCl_2 30 parts (calcd. as cryst. chloride) to 100 parts of magnesia. Fillers such as asbestos, sand or cork may be added but fillers are to be preferred which do not absorb H_2O to any great extent as excess of H_2O destroys the non-corrosive character of the cement. The H_2O should not exceed 70% of the MgO . (C. A.)

Art

Clay figures of palaeolithic age. ANON. *Nature*, 113, 506(1924).—The discovery has recently been made by M. Norbert Casteret of some remarkable examples of palaeolithic art in the vicinity of Saint-Martory (Haute Garonne). In a cavern were found not only rock carvings of animals and a human head, but some clay models in the round and in bas-relief. Geol. evidence indicates that these figures date back to a cold and very dry period when the parts of the cavern now filled with water from a subterranean stream were readily accessible. The find is notable in that the only previous discovery of a like nature is that made by M. le Comte Begouen at the Tuc d'Audoubert in 1912.

O. P. R. O.

Cement, Lime and Plaster

Getting rid of efflorescence on gypsum plaster. E. C. WELCH. *Chem. Met. Eng.*, **31**, 263-4(1924).—Efflorescence is due to sol. salts in the mixing water, sand, or calcined mat. Fairly insol. compd. such as gypsum may be deposited as efflorescence if water percolates through the mat. continuously, or if water is condensed and evapd. on the surface of the mat. repeatedly. Lime added to the plaster or used in the finish coat usually prevents efflorescence. Addition of $1\frac{1}{2}\%$ of dextrine or gum arabic to the mixing water reduces efflorescence on casts considerably. M. E. M.

What is good magnesium oxychloride cement? H. L. OLIN AND B. H. PETERSON. *Chem. Met. Eng.*, **31**, 266-7(1924).—The effects of additions of various mat. to magnesium oxychloride cement were noted. 120-mesh calcium carbonate had no effect up to 6%. Iron and aluminum oxides up to 4% had no effect. Calcium oxide lowered the tensile strength in direct propn. to the per cent present. The last mat. has no effect on the temp.-vol. change, but lowers the tensile strength by increasing the setting shrinkage. Addition of 6% free lime increased the setting shrinkage ten-fold. M. E. M.

Silicate of soda and concrete. ANON. *Chem. Age*, **9**, 118(1924).— Na_2SiO_3 is being used as a wash for concrete in ratio of 1:4 of H_2O . Gives a hard surface resisting abrasion on road work. Eliminates growth of fungus on sewage tank walls and reduces the permeation of H_2O . S. S. C.

Bricks from blast furnace slag. ANON. *Chem. Age*, **9**, 11(1924).—Slag mixed with 6-10% of $\text{Ca}(\text{OH})_2$ which must be completely slaked. Special hydrater used to give ample opportunity for mixing of CaO and H_2O . Slag and lime mixed in edge roller mill. Molded under 4000 lb. press. per sq. in. Heated 5-6 hr. in steam at 212°F . Crushing strength of brick 4800 lb. per sq. in. S. S. C.

Thermo-chemistry of Portland cement burning. M. DAUTREBANDE. *Quarry & Surveyors' & Contractors' Jour.*, **29**, 218(1924); *Chaleur et Indus.*—The thermic reactions produced during burning process of the mat. of artificial Port. cement are complex, and if some are well detd. others are still open to conjecture. D. concludes that artificial Port. cement is produced from ground clinker or rock obtained by burning to

TABLE I

| | Clay | | Schist | |
|-------------------------|-------|-------|--------|-------|
| | 1 | 2 | 1 | 2 |
| Loss by heat | 11.90 | 10.90 | 7.25 | 8.80 |
| SiO_2 | 54.00 | 59.80 | 58.40 | 53.90 |
| Al_2O_3 | 16.00 | 14.11 | 16.39 | 20.40 |
| Fe_2O_3 | 5.50 | 4.10 | 9.11 | 8.10 |
| CaO | 9.50 | 7.80 | 4.22 | 5.10 |
| MgO | ... | 1.20 | 2.05 | 1.35 |
| SO_3 | ... | ... | 2.01 | 1.44 |

TABLE II

| | Limestones | | Clayey limestones | |
|---------------------------|------------|--------|-------------------|-------|
| | 1 | 2 | 1 | 2 |
| Loss by heat | 42.61 | 39.20 | ... | ... |
| SiO_2 | 0.64 | 5.80 | 30.60 | 22.15 |
| Al_2O_3 } | 1.825 | 3.55 | 12.50 | 9.00 |
| Fe_2O_3 } | | | | |
| CaO | 55.30 | 52.10 | 31.54 | 37.92 |
| MgO | 0.47 | traces | 0.80 | 1.10 |
| SO_3 | traces | ... | 0.30 | 0.20 |

vitrification point of a thoroughly and finely ground mixt. of carbonate of lime in the form of chalk marl or limestone, and of clay or schist, and gives the preceding analytical tables of the component parts of the mixt. after burning.

During the burning process the following reactions take place: (1) Elimination of water; (2) decompn. of the carbonate of lime into carbonic acid and lime $\text{CO}_2\text{CO} = \text{CO}_2 + \text{CaO}$; (3) decompn. of carbonate of magnesia into carbonic acid and magnesia, $\text{CO}_2\text{Mg} = \text{CO}_2 + \text{MgO}$; (4) combination of the silica with the lime to form silicates of lime; (5) combination of the alumina with the lime to form aluminates of lime; (6) oxidation of iron protoxide; (7) combustion of organic matter and of sulphur of sulphurets, while certain sulphates are not decomposed at burning temp.; (8) volatilization of alkaline salts.

TABLE III

| | 1 | 2 | 3 |
|-------------------------|-------|-------|-------|
| Loss by heat | 0.50 | 1.00 | 0.84 |
| SiO_2 | 22.91 | 22.00 | 26.36 |
| Al_2O_3 | 6.75 | 9.50 | 7.82 |
| Fe_2O_3 | 3.00 | | 2.18 |
| CaO | 64.34 | 65.25 | 64.50 |
| MgO | 2.00 | 1.08 | 0.21 |
| SO_3 | 0.50 | 2.04 | 1.35 |

Of the several reactions and combinations induced by the burning process, some (the endothermic) absorb heat, while others (the exothermic) liberate ht. The endothermic reactions are: (1) Decompn. of carbonate of lime into carbonic acid and lime which requires 436 cal. per kg. of carbonate of lime; (2) decompn. of carbonate of magnesia into carbonic acid and magnesia requiring 213 cal. per kg. of the carbonate; and (3) elimination of water. The exothermic reactions are: (1) Combustion of organic matter, carbon giving 8080 cal., and (2) combustion of sulphur which, in transforming to SO_3 , gives 2250 cal. As regards the combination of silica and alumina with lime, these, according to Berthelot, would give 591 cal. per kg. of lime, or 331 cal. per kg. of carbonate of lime (1 kg. of CO_3Ca containing 0.56 of quicklime). These combinations may be exothermic, as shown by calc., which work out with too low a value for reactions to add anything to ht. augmentation. M. Hendricks considers these reactions as exothermic but, though liberating a considerable quantity of ht., they are incapable of raising the temp. of the burning mass in reaction, because their ht. is utilized in counterbalancing another endothermic reaction produced at the same time, *viz.*, the dissolution of the alite (a silicate of calcium). As to firing temp., the firing of the clinker-producing mat. results not in fusion but rather in a vitrification marked by elimination of vol. and augmentation of d. in the mass. Various factors influencing temp. are: (1) homogeneity of aggregate, fineness of grinding and wetness, and (2) chem. compn. In one dry process a higher figure than 15% of water has facilitated burning, while, with a very dry meal, combination is retarded and a start in burning appears to be slow and difficult. As to chem. compn., the melting of iron oxide and alumina may be considered to facilitate burning, while a high percentage of lime renders this operation more difficult. The form of the silica used has also a great effect, as sol. it combines more easily and at a lower temp. than it does in an amorphous or quartzose state. It can be assumed that at 900°C carbonic acid is completely expelled and that certain reactions between the silica and the iron oxides and the alumina are beginning, and that burning will be finished at about 1550°C . For a meal leaving 23.6% on a 200 per cu. cm. mesh sieve, the burning temp. necessary is above 1612° , while for the same mixt., but ground so as to leave only 2% on the same sieve, it requires a temp. of 1475°C . For a 62.64% of lime in the clinker, firing temp. was 1549° , while for 63.83%

it was 1593°, and for 62.12%, 1625°. Waste gases from furnaces range from 300° to 600°C., depending upon the burning process installed, and also on the length of the fur. These gases have been utilized for various purposes, such as drying of paste, htg. of boilers, and preliminary firing or calcination of mat. in sep. fur. In a fur. 20 m. long and 2 m. in diam., it is calcd. that there is a loss of 72° of the total ht., though this amt. has been reduced to 36%. The gases of one fur. 50 m. long and 2.75 m. in diam., used for the wet process, had a temp. of 400°C when issuing, but the loss of ht. through the flues was only 18% of all produced.

O. P. R. O.

Lime (S. Africa). T. G. TREVOR. *S. African Jour. of Indus.*, **7**, 459(1924).—Three forms of limestone are at present known and worked in S. Africa: (1) Magnesium limestone (common dolomite), which covers vast areas in the Transvaal and Cape Provinces; (2) white lime deposits have been inadequate to meet the demand for chem. and metallurgical purposes, but an extensive deposit of pure white limestone, said to contain not less than 7,000,000 T., is now being opened up at Taung, Bechuanaland; and (3) desert limestone covers vast areas in all the Provinces, but it contains 20% silica and other impurities. It is used for cement making, for other purposes it does not generally yield a good lime.

O. P. R. O.

The dehydration of gypsum. P. JOLIBOIS AND P. LEFEBRE. *Oil and Color Trades Jour.*, **66**, 684(1924).—When the temp. does not exceed 160°C, the loss of water corresponds to the formation of a semi-hydrate. A complete dehydration can be effected rapidly at 200°. These observations explain why plaster taken out of the ovens or fur. is a mixt. of anhydrous sulphate of lime and semi-hydrate. It is well known that if the temp. exceeds 300° the plaster obtained will no longer set with water. (*Rev. de Chim. Ind.*) See *Ceram. Abs.*, **2** [10], 214(1924).

O. P. R. O.

A hundred years of Portland cement. K. GOSLICH. *Zeitschrift für Angewandte Chemie*, **37**, 265, 297, 504(1924).—A history of the growth of the Portland cement industry in Germany outlining the development of the various processes to the present time.

O. P. R. O.

Portland cement of high basicity. FABIO FERRARI. *Atti congresso naz. chim. pura applicata*, **1923**, 286–93; cf. *C. A.*, **15**, 2345.—Expts. are described on artificial calcined products to det. the reln. between the hydraulic properties and (1) the compn. and nature of the generating mixt.; (2) the fineness of grinding and homogeneity of the resulting mixt.; (3) the temp. of firing; (4) the rate of cooling and (5) the fineness of grinding of the cement. The mixts. were prepd. by a method already described (cf. Ferrari, *Le industrie costruttive*, **20**, No. 1, 1923). The best products in 2 series of tests had the following properties: CaO/(SiO₂ + Al₂O₃ + Fe₂O₃) ratio 2.23, 2.27; SiO₂/(Al₂O₃ + Fe₂O₃) ratio 2.97, 3.25; Al₂O₃/Fe₂O₃ ratio 1.55, 0.65; d. 3.06, 3.03; initial set 2.25, 3.33 hrs.; final set 4.08, 5.5 hrs.; expansion (Le Chatelier) 0, 0; resistance to compression in kg. per cm². after 3 days in H₂O 253.4, 235.7; after 7 days in H₂O 235.7, 369.0; after 28 days in H₂O 574.7, 667.5; after 28 days in air 601.9, 632.2.

C. C. D. (C. A.)

Action of calcium chloride and calcium sulfate on the setting and hardening of Portland cement. FABIO FERRARI. *Atti congresso naz. chim. pura applicata*, **1923**, 294–7; cf. Candlot, *Chaux et Ciments*, Paris, **1908**.—In view of the fact that CaO is a normal component of Portland cement (cf. *C. A.*, **15**, 2345), that it plays an essential part in the setting and hardening, and furthermore that its action has not been satisfactorily explained, expts. were made to det. the action of CaCl₂ and gypsum during the setting and hardening of a mixt. of CaO and SiO₂. A mixt. of CaO and quartz (20:80) ground to the ordinary fineness of cement set in 10 min. when made into a paste with H₂O alone. The same mixt. with 2–3% CaCl₂-soln. set in approx. 9 hrs., a result in accordance with the fact that CaO becomes hydrated with extreme rapidity in the

presence of CaCl_2 and that $\text{Ca}(\text{OH})_2$ is almost insol. and crystallizes very slowly. With 30% CaCl_2 soln. however the paste set in 5 min. and became extremely hard in a short time, due to the formation of an oxychloride (cf. Le Chatelier, *Recherches expérimentales sur la constitution des mortiers hydrauliques*, Paris, 1904). A mixt. contg. 19.6% CaO , 78% quartz and 2% gypsum set in approx. 4 hrs. with H_2O alone, with noticeable hardening. When a const. wt. of a mixt. of CaO and gypsum in varying proportions was agitated with H_2O , the max. rise in temp. increased with the amt. of gypsum. Unlike the ordinary product obtained with CaO and H_2O , the products even with a low amt. of CaSO_4 were composed of minute hard granules. The expts. indicate in general that setting is retarded by gypsum and small amts. of CaCl_2 (cf. C. A., 16, 2586, 4318) but is accelerated by a large amt. of CaCl_2 . C. C. D. (C. A.)

Portland cement silicic acid. F. HART. *Zement*, 12, 300-1 (1923).—Three Port. cements were very finely ground, treated with HCl , and the silica which sepd. later was washed and then exposed to air at a definite temp. and of definite humidity until const. in weight. The relative propns. of water and silica in the product at various intervals were detd. and the results plotted on a compn.-time chart. The water content decreased regularly for 11 days, but then the curve showed a sudden change of direction and the water content subsequently remained practically const. The point at which the change occurred corresponded to a compd. contg. 62.78% of silica and 37.22% of water, i. e., to an orthosilicic acid, with each of the cements examd. B. C. A. (C. A.)

Development of hydraulic properties in granulated blast-furnace slags. H. KUHL. *Zement*, 12, 320-2 (1923).—Apparently small differences in slags may cause great differences in the nature of the resulting cement. Some blast-furnace slags—particularly those rich in alumina—produce excellent cements when ground with a large percentage of CaSO_4 , with or without a suitable “developer of hydraulicity” such as lime or Port. cement clinker. The addn. of 1% of lime is useless. When 3-5% of lime is used, the mixt. remains “dead” for some days and then suddenly develops a high strength. Port. cement when added to a slag behaves in a similar manner to lime, but the final product is not so strong, 30% of cement clinker having a similar effect to 8% of lime. When CaSO_4 alone is added, at least 12% is required to produce a mixt. having a satisfactory crushing strength after 28 days. The best results, so far as tensile and crushing strengths are concerned, were obtained with a slag from cast iron, with a mixt. of 86% of slag, 8% of lime, and 3-9% of CaSO_4 . A mixt. of 70% of slag, 30% of cement clinker, and 2-10% of CaSO_4 gives similar results. B. C. A. (C. A.)

Influence of the chemical composition of slags and Portland cements on the hardening of blast-furnace cement and on its resistance to sulfates. R. GRÜN. *Zement*, 12, 297-8, 307-10, 317-9, 326-9 (1923).—Several Port. cements and blast-furnace slags and mixts. of these in various proportions were examd. and it was found that with each slag also there was 1 Port. cement which gave better results than the others; the ore cement was as good as any of the Port. cements. In blast-furnace cements the slag acts as a carrier of the hardening agent and is the source of strength; the influence of the Port. cement is much less than that of the slag. The influence of the Port. cement on the resistance of a blast-furnace cement to sulfate solutions is low, but is greater than its influence on the crushing strength. All the mixts. gave better results than any of the sep. materials. The slags least resistant to sulfate solns. were those lowest in silica and high in alumina or Mn. The mixts. contg. Port. cement with less than 63% of lime and these with the ore cement were the most resistant to sulfates; these were also low in alumina. B. C. A. (C. A.)

Influence of the chemical composition of slags and clinker on the hardening of blast-furnace cements and on their resistance to sulfates. HÄGERMANN. *Zement*,

13, 2-3(1924).—A criticism of Grün's paper (cf. above) dealing chiefly with questions of priority and also pointing out that as the Port. cements used by Grün were of poor quality his results must be accepted with caution. B. C. A. (C. A.)

Influence of sugar and similar substances on the setting and hardening of cement and cement-mortars. BURCHARTZ AND VON WROCHEM. *Zement*, 13, 11-3(1924).—The use of a 0.1% soln. of sugar instead of water when mixing cement slightly increases the strength, but if a 0.25 or 0.5% soln. is used, the strength is diminished and the test-pieces crack in water. When a 1% soln. is used the cement has a low strength at 7 days, but an abnormally high one at 28 days. A 1:3 cement sand mortar behaved similarly, but great strength at 28 days was not developed. When glucose or tannic acid was substituted for sugar, a similar loss in strength occurred. When samples of cement mortar were immersed in a 1% soln. of sugar for 28 days no change occurred in their strength. Microscopical examn. showed that sugar and similar substances hinder the formation of crystals in cement-mortar and also hinder the swelling of the cement particles. This power of sugar and similar substances to reduce the strength of cement mortars suggests that when a cement is found, in use, to give low results a search should be made for org. substances in it, in addn. to making the usual tests.

B. C. A. (C. A.)

Enamel

Interchangeable air system reduces operating cost in enameling plant. ANON. *Cer. Ind.*, 3 [2], 99-102(1924).—Rept. of visit to The Vitrified Iron Products Co. of Clyde, Ohio. Cast iron and sheet steel porcelain enamel ware are manufd. The cast iron pieces are kept in a drier until enameled, after being sand blasted. The sheet steel is left in the cleaning tank for from 7 to 10 mins. and is pickled for about 7 mins. The baths are kept near the b. p. with open steam jets. The smelter has a capacity of smelting 800 lbs. of raw material in 2 hrs. The recuperation principle is very effectively employed, the primary air being preheated to 700°F. Low press. air and high pressure oil are used in the burners. The hearth of the smelter is built in the form of the letter "V" with a slope of about 20° from the back wall to the tap hole. An interchangeable air compressor and fan arrangement permits continuous operation throughout the plant. The driers are gas heated and equipped with canvas doors. The furs. are oil-fired and equipped with 3 recuperators. A uniform temp. is insured throughout the length of the fur. by having the openings to the recuperator chambers at the front of the fur. The 8-in. oil burners operate on 60 lbs. oil pressure and 12 ozs. air press. From 8 to 9 gals. of oil are required per hr. to fire from 400 to 600 sq. ft. of sheet steel or over 400 lbs. of cast iron. The sheet steel ground coat is fired at between 1650 and 1675°F and the cover coat at between 1625 and 1640°F. The cast iron enamel is fired at between 1350 and 1400°F. The temp. is measured with pyrometers and the time with sand clocks.

P. D. H.

The use of antimony in the enamel industry. B. REWALD. *Chem.-Ztg.*, 48, 280(1924).—While SnO_2 is the most commonly used opacifier, Sb has lately gained wider recognition. In many countries the use of Sb in technical enamels is forbidden on account of the danger to health. But if the Sb is properly fritted there is no danger and its use should not be forbidden.

C. H. K. (C. A.)

Enamel apparatus and its use. WENZ. *Chem. App.*, 11, 89(1924). J. H. M.

Glass

Tremendous strides made by plate glass industry in last decade. ANON. *Cer. Ind.*, 3 [2], 95-8(1924).—One of the most costly items in the manuf. of plate glass has been glass pots. An average of 12 melts per pot is considered a good record. In most

branches of the glass indus., the continuous tank fur. has replaced the pot fur. A plant is thus enabled to operate continuously and at a lower cost than with the pot fur. While fuel is an important item, the principal expense of glass making has been the labor cost. Modern machinery, however, is gradually replacing hand labor. The automobile indus. requires 50% of the annual plate glass output. There are tables giving the production of bldg. glass in the U. S. and the exports and imports over a period of years. P. D. H.

Glass manufacture (Czechoslovakia). ANON. *Indus. Aust. and Min. Stand.*, **71**, 878(1924).—A history of the glass indus. of Czechoslovakia, which now ranks 2nd largest in Europe. It comprises 160 factories and 3600 small establishments where glassware is cut, engraved, etched, painted or mounted. O. P. R. O.

Electric furnace for glass-making. J. E. PARKER. *So. Af. Jour. Indus.*, **3**, 158-60(1920).—A treatise on the suitability of the elec. fur. for glass-making. The difficulties to be overcome in the design of an elec. fur. suitable for the smelting of the "batch" and "fining" are very minor ones, and a good type of elec. fur. would produce a glass of the purest quality economically and at a min. of loss. The points in favor of the elec. fur. are its increased production and regular uniform good quality glass. The operating costs of such a fur. would show a considerable saving per ton of glass over the existing system. O. P. R. O.

Wood's metal as a seal in vacuum apparatus. LARS A. WELO. *J. Optical Soc. Amer.*, **8**, 453-4(1924).—Wood's metal applied to glass or quartz with a soldering iron molds itself and adheres sufficiently well so that tubes may be joined by soldering the junctions with the same mat. The method is satisfactory for glass or quartz. D. E. S.

Correlation between crack development in glass while conducting electricity and the chemical composition of the glass. EARLE E. SCHUMACHER. *J. Am. Chem. Soc.*, **46**, 1772-7(1924).—Measurements were made at a temp. of 300° of the susceptibility to crack development of 5 different kinds of glasses when conducting electricity, by detg. the no. of times the current could be reversed before the glass cracked. The tendency to crack increases with increasing alkali content and elec. condy. of the glass. Borosilicate glasses showed the least tendency to crack of any of the glasses tested. The anal. of 4 of the glasses are included. D. E. S.

Phosphorescence of fused transparent silica. CHAPMAN AND DAVIES. *Nature*, **113**, 309(1924).—When oxygen or hydrogen is driven into fused quartz by the elec. discharge quartz acquires the property of phosphorescing. This property is probably intimately connected with the absorbed gases. A large quartz tube 100 cm. long and having a diam. of 3.5 cm. was provided with external electrodes of aluminium foil 35 cm. apart. The tube was filled with oxygen (from which mercury and other condensable vapors had been removed by liquid air) at a press. of about 0.035 mm. of mercury. The gas in the quartz tube was submitted to the action of the silent discharge. When the discharge was stopped it was noticed that the tube or its contents were glowing brightly and continued to glow for more than 20 mins. The luminescence was at first thought to be the well-known afterglow of oxygen, but was found to be due to the quartz itself or to the oxygen absorbed near its inner surface because (1) when a small area of the tube is cooled with liquid air while the discharge is passing, that area glows much more brightly than the rest of the tube after the discharge has been stopped; (2) cooling a portion of the tube after the discharge has been stopped has no effect; (3) the sections of the tube which absorb larger quantities of the gas during the discharge phosphoresce more brightly; (4) after the glow has ceased the quartz can again be made to phosphoresce by heating it; but it entirely loses this property when all the absorbed gases have been removed. The phosphorescence caused by heating can be

observed with no apparent diminution in intensity 24 hrs. after the stimulating discharge has been stopped, and the phenomenon is just as pronounced after all the unabsorbed oxygen has been pumped out of the tube. Similar results have been obtained with hydrogen.

O. P. R. O.

Coppered glass mirrors. E. A. H. FRENCH. *Nature*, **113**, 806(1924).—Earlier research on this subject was conducted in 1907 by Chattaway, using phenylhydrazine as a reducing agent, but on his findings it was not possible to obtain a coherent copper film on plate glass surfaces. This was probably due to the formation of tarry by-products, which appear inevitably to result when such a reducing agent is used. Expts. were conducted at the War Department Searchlight Exptl. Establishment with the object of eliminating this drawback. It was found that a satisfactory coherent and lasting film can be deposited on plate glass surfaces at a comparatively low temp. by the use of hydrazine sulphate. The cleaning of the glass surface is peculiarly important.

O. P. R. O.

Material handling in a glass works. C. MICHENFELDER. *Zeits. für Angewandte Chemie*, **37**, 488(1924).—A short description of operations from the point of economy and profit.

O. P. R. O.

The periodic system of the elements and the mechanical and technological properties of glasses. J. SALPETER. *Z. tech. Physik*, **4**, 36-9(1923).—The oxides of Na and K increase the coeff. of thermal expansion of a glass far more than the oxides of Si, B, and Mg. S. finds a parallel between the at. vols. of the elements and their influence upon the coeff. of expansion of glasses. A similar relationship is indicated between at. vols. of the elements and their influence upon the tensile strength and between at. vols. and compressibility of the glass.

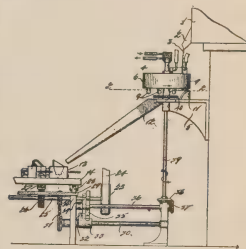
L. M. H. (C. A.)

Chapman-Stein recuperator. WM. C. BUELL, JR. *Iron and Steel Engineer*, **1**, 327-39(1924).—A recuperator has many advantages over a regenerator. A well illustrated description is given of the Stein recuperator, together with its advantages in design, operation, and economy.

I. A. P. (C. A.)

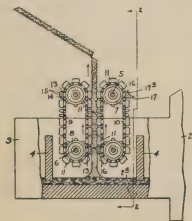
PATENTS

Machine for forming glass articles. HENRY M. BROOKFIELD. U. S. 1,505,537, Aug. 19, 1924. In app. for forming articles of glass, in combination with means for feeding molten glass in a continuous unconfined stream, of a distributor for dividing said stream into separate masses to be subsequently delivered to molds, said distributor comprising a horizontally rotatable table provided with a series of vertically walled openings therethrough, means for intermittently rotating said table to bring said openings successively into line with said stream of molten glass, and a stationary shear member adjacent to the stream of glass and to the upper surface of the table and adapted to cooperate with the upper end of each opening to sever the stream of glass and carry it over the intervening table surface to the succeeding opening as the table makes its intermittent movement of rotation.



Method of drawing sheet glass. HUDSON S. CAMPBELL. U. S. 1,505,584, Aug. 19, 1924. The method of forming sheets of glass consisting in drawing the sheet continuously from a bath of molten glass, severing the glass, gripping the succeeding sheet simultaneously with the severing just below the point of severing, and gripping the side edges of the sheet at intervals to keep the sheet taut, all while in a plastic condition.

Glass pot furnaces, etc. M. W. TRAVERS, F. W. CLARK and TRAVERS AND CLARK, LTD. Brit. 213,999, Jan. 15, 1923. (C. A.)



Heavy Clay Products

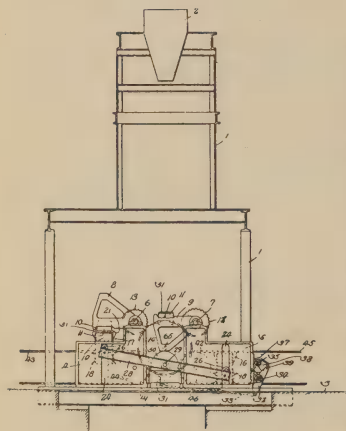
Report of Committee C-10 on hollow building tile. W. A. HULL. *Proc. A. S. T. M.*, 23 [1], 230(1923).—It is recommended that the present tentative specs. for clay hollow bldg. tile continue as tentative and that certain revisions of the tentative definitions of terms relating to hollow tile be accepted. E. N. B.

Tentative definitions of terms relating to hollow tile. ANON. *Proc. A. S. T. M.*, 23 [1], 640-3(1923). E. N. B.

Brickmaking at Quilon, India. ANON. *Brit. Clayworker*, 33, 118(1924). H. G. S.

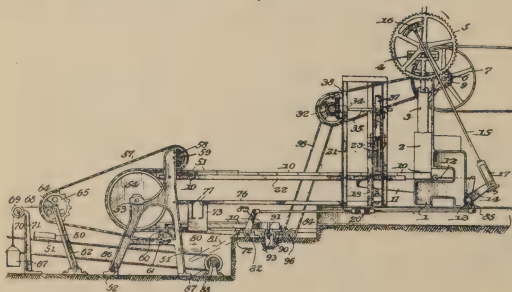
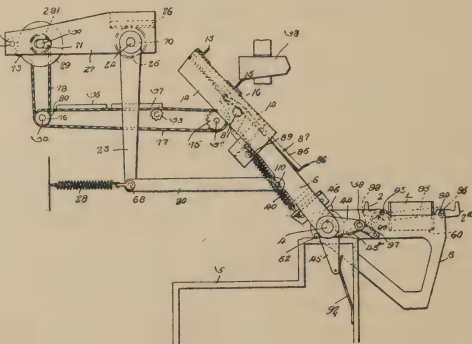
PATENTS

Brickmaking machine. ROY P. M. DAVIS. U. S. 1,506,221, Aug. 26, 1924. In a brick making machine, a pair of pivoted mold supports and molds carried thereby, means for feeding a charge of mud alternately to the molds to form brick therein, means for simultaneously rocking said mold supports in opposite directions to filling and dumping positions respectively, a pair of vertically movable dumping tables one for each mold support, upon which the mold supports alternately deposit the brick carried thereby, means for simultaneously elevating one table and lowering the other, a brick conveyor, said tables when elevated receiving the brick from said mold support, and when lowered depositing the brick upon said conveyor, the movements of said mold supports and tables being in synchronism.



Pallet machine. ROY P. M. DAVIS and IRVIN F. HEPLER. U. S. 1,506,222, Aug. 26, 1924. In a brick making machine, a mold support and mold carried thereby, a pallet carrier, means for delivering a pallet to said carrier, said pallet carrier and said mold support being swingable about a common axis in opposing directions to bring said mold and the pallet on said pallet carrier into juxtaposition.

Brick machine. GEORGE C. ADAMS. U. S. 1,504,302, Aug. 12, 1924. In a brick machine, means for



striking or rapping the molds comprising gravity-actuated pendant swinging hammers adapted to strike the sides of the mold, and means for raising and releasing said hammers to permit them to fall by gravity to deliver their blows on the mold. In a brick machine, means for unloading the molds containing the brick, comprising means for bringing the

molds and their pallets into inverted position, means for supporting the mold when in inverted position, shiftable means for engaging and supporting the pallet and the brick when the mold is in inverted position, and means for lowering away the pallet and brick from the mold, said means being adapted to disengage the pallet supporting means when operating to engage the pallet and permitting the pallet supporting means to return to supporting position to support the pallet on a succeeding mold when the pallet and brick of a preceding mold have been lowered.

Refractories

Silica brickworks and coke ovens. A. H. MIDDLETON. *Colliery Guar.*, **127**, 157(1924).—Silica brickworks and coke oven plant of the Consett Iron and Steel Co., Consett, England, were visited on July 10 by members of the North of England Inst. of Min. & Mech. Engrs. M. stated that these works have excited much interest with visitors from Holland, France, Germany, Austria, Australia, India and Czechoslovakia. Dr. Endell stated that he considered these the best equipped works in the world, and the mat. made there the best in the world, but he doubted whether it was commercially possible to put such mat. on the market. M. states they could put the mat. on the market as a commercial undertaking if people were willing to pay a little more for a good thing than a bad one. In bldg. their Fell ovens, of 3600 T. of silica brick made at their own works they had not cut one piece. The fire clay brick they bought had to be cut, costing in the latter case 3 times as much in bricklayers' wages for cutting brick as laying brick. A brick is never so strong after it is cut as a brick retaining the kiln skin upon it. It was no expt. in bldg. walls in coke ovens of silica. All coke oven walls found in America were built of silica. Other features were the high-speed machinery, the remote coke-quenching, and the iron and steel bindings. The big reduction in coking time accompanied by an increase in temp. and was one of the stumbling blocks in the way of coking engineers. Their old ovens were working at a max. efficiency as high as any in the country and these 21-in. ovens were pushed in 26 hrs. In the new ovens with a reduction of only 3 in. in the width they had reduced the coking time from 26 hrs. to 16 hrs. 20 min. without any increase in temp. The yields of by-products were the same as in the old plants. The coking time could be reduced further by raising the temps. and a reduction in coking time to 14½ or 15 hrs. was possible. There was no reduction in size of coke except through the 3-in. reduction in the width of the oven. The largest size of coke was necessarily 1½ in. smaller. The whole industry of silica brick-making has changed during the past 3 or 4 yrs. Research work of Dr. Mellor and the British Refractory Assoc. has helped. With regard to making of shapes by machinery, the number of shapes was so great in the Wilputte oven and other ovens (over 300 shapes being employed) the cost of the dies would be prohibitive. The plant has been in operation 14 wks. drawing 75 ovens per day. O. P. R. O.

Refractory facts. ANON. 158 pp.—A handbook of information about fire clay products, including a short outline of chemistry, issued by the Walsh Fire Clay Products Co.

O. P. R. O.

Chromite (Transvaal). P. A. WAGNER. *S. Af. Jour. Sci.*, **20**, 223(1923).—The chromite of the Bushveld Igneous Complex: origin of chromite, its petrology, chem. compn. and anal. are discussed. Occurrence of chromite, its extent and economic conditions are dealt with; the article is illusd. with plates. O. P. R. O.

Graphite in Canada. H. P. H. BRUMMELL. *Jour. of Commerce*, **52**, 10(1924).—Canadian graphite material excels for crucible making. Canada promises to dominate the world's graphite industry. During the past few years the govts. of the U. S., Great Britain and Canada have been making exhaustive inquiries and investigations. It was not, however, until the advent of the oil frothing flotation method of concn.

had been perfected that it was possible to supply Canadian graphite at prices which allowed any profit to the producer. O. P. R. O.

What demands are made today upon the refractory materials in the cement industry? K. ENDELL. *Zement*, **13**, 230-3(1924).—Combining the usual testing of refractories with their life in practice. K. finds the kiln linings of clinker and cement to be the most economical. The app. used to det. the deformation of materials under load while heating is described. The action of the fusing clinker upon kiln linings is discussed. H. F. K. (C. A.)

Fuel and refractory lining material. HIRSCH. *Keram. Rundschau*, **31**, 14(1923); *J. Soc. Glass Tech.*, **7**, 194-5.—The necessity for the testing of refractory materials before use was emphasized. Particular reference was made to refractory materials for boiler-furnaces where the chem. action of slags was an important factor. The action of slag on refractory material was tested by placing pulverized slag in a cavity cut out of a block of the refractory material and burning the whole at Seger cone 14. The action of the slag was seen by cutting through the test piece. Eight slags of the following compn. were tested with blocks of the same shale: loss on ignition 0.5, 4.1, 2.6, 2.9, —, 0.1, —, 6.3; SiO_2 47.7, 52.3, 49.3, 45.6, 10.8, 46.3, 17.0, 5.8; Al_2O_3 42.9, 33.0, 31.9, 35.5, 9.6, 6.2, 17.2, 12.6; Fe_2O_3 3.8, 4.9, 6.3, 3.0, 25.5, 25.8, 15.5, 10.0; CaO 4.5, 3.5, 6.8, 6.7, 34.6, 19.8, 40.4, 50.6; MgO 0.1, 1.8, 1.5, 3.7, 1.6, 1.7, 4.6, 11.2; alkalis 0.6, —, —, 1.2, 1.6, 0.2, 0.2, 3.5; SO_3 —, 0.3, 0.1, 0.6, 16.4, —, 3.9, 0.1; S —, 0.1, 0.3, 0.9, —, —, 1.0, —; cone m. p. 27, 17, 14, 12, 10, 9, 12, 11. The first 4, which were coal slags, had only a slight corrosive effect. The lignite slags (numbers 5-8) produced corrosion in varying degree, the last showing complete soln. of the walls of the cavity. With powerful slags, the most suitable refractory material was chosen by comparison, by testing the same slag with blocks of different refractory materials. The densest material was the most resistant to attack. The action of a slag rich in Fe_2O_3 and CaO was tried on a shale, first, unprotected, secondly, with a facing of corundum, thirdly, with SiC , and fourthly, with a lining of "dynamidon," a product with more than 70% Al_2O_3 . The last-named proved most efficient, the slag having no action. Low d., high Al_2O_3 content, and high degree of refractoriness (not less than Seger cone 28) were shown to be very necessary properties. It was also important that the bricks should be uniform and free from flaws. They should have sharp edges, ability to withstand changes of temp., a compression resistance of at least 80 kg. per sq. cm., and an after-shrinkage, when heated to Seger cone 14, of not more than 2%. The cement used should also be adapted to the slag and the joints should be made as thin as possible. The fire-box of the boiler furnace should be built as big as possible to prevent too strong local heating by the flames, and trouble by deposits of slag. H. G. (C. A.)

Pyrometric test of refractory clays. F. J. A. DEJARDIN. *Rev. universelle mines*, **2** [7], 49-55(1924).—A procedure is described for testing clays by the Seger-cone method, which is claimed to be particularly reliable. A furnace which is essentially a modification of that of Meurice (cf. *Cours d'Analyse Quantitative des Matières Minérales*, Paris, 1908, 123) is recommended for carrying out the heating. The sample is ground to pass a 1-mm. sieve and kneaded to a firm paste with H_2O . On compressing in the proper mold, a thin paper core may be found convenient for easy removal. Drying should be done in the open at 16-18° and should be very slow (at least 3 days). Not over 55-60 min. are required for reaching 1690°. C. C. D. (C. A.)

Softening of refractory materials. H. HIRSCH AND M. PULFRICH. *Tonind. Ztg.*, **47**, 801-6(1923).—Ten silica bricks and one sample of quartzose shale were analyzed and the normal refractoriness, the refractoriness under a load of 1 kg. per sq. cm., porosity, crushing strength, expansion, and sp. gr. were detd. All but one of the silica bricks and the quartzose shale showed a slight expansion when heated, though this

was very slight below 1300°. The failure occurred in each case very suddenly, the difference between the temp. at which softening was first observable and that at which collapse occurred being less than 100°, and often less than 30°. The silica brick which behaved differently from the others contained only 89% SiO₂ and as much as 5.8% Al₂O₃, and therefore contained clay. It behaved like a brick made of clay and quartz. Eighteen fire clay bricks when similarly heated under a load of 2 kg. per sq. cm. retained their vol. to about 1250°, and then began to contract. They did not collapse suddenly, like the silica bricks, but slowly lost their shape as the temp. rose, except those bricks which contained over 80% SiO₂; these bricks collapsed more suddenly, but not so rapidly as silica bricks.

B. C. A. (C. A.)

Broken saggars as grog. ANON. *Brit. Clayworker*, **33**, 114(1924).—The use of broken saggars as grog for fire brick is recommended. This has the advantage over other grog in that it has been repeatedly fired.

H. G. S.

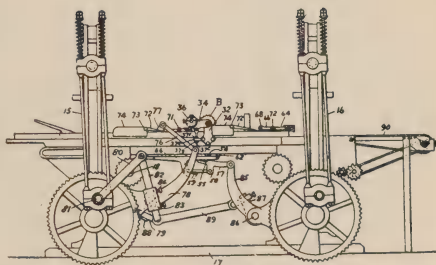
The softening temperature of fire brick. HIRSCH AND PULFRICH. *Brit. Clayworker*, **33**, 112(1924).—Silica brick do not deform out of shape under load until 1300°C is reached. Some of the purer brick do not deform until 1500–1700°C is reached. The first signs of softening of fire brick under load is evident between 1130° and 1390°C and the rapid collapse is between 1370° and 1700°C. Magnesite brick begin to soften under load at 1430°C and 1625°C. The difference in temp. between the commencement of softening and complete collapse is between 50° to 80°.

H. G. S.

PATENT

Brick machine. JAMES R. TACKETT. U. S. 15,889 (reissue), Aug. 12, 1924. Original No. 1,460,455, dated July 3, 1923. In a brick-treating machine, a brick press,

a brick re-press in spaced reln. to each other, a brick support interposed between the presses on which bricks are transferred from one press to the other, horizontally reciprocating brick pushing elements for engaging bricks and pushing them over the support, vertically and longitudinally reciprocating brick-carrying elements in operative relation to the support for lifting the bricks from the support and transferring them longitudinally thereof and re-depositing them thereon, and means for operating the brick-pushing elements and brick-carrying elements oppositely.



Whitewares

Contribution to the better knowledge of genuine hard porcelain. K. H. REICHAU. *Trans. Ceram. Soc. (Eng.)*, **23**, 145–53(1923–24).—Describes the application of the polarizing microscope to det. the structure of porcelains and glazes.

H. F. S.

The effect of different grades of feldspar and iron oxide on stoneware clays and floor tile made therefrom. KURT SAMSON. *Trans. Ger. Ceram. Soc.*, **5**, 1(1924).—Tests made in the research lab. of the state porcelain works in Charlottenburg with 3 characteristic floor tile clays, 2 German and 1 Norwegian feldspar and iron oxide. Test pieces burnt at Seger cones 010a, 05a, 1a, 3a, 6a, 10 and 12 were tested for (1) shrinkage and sp. gr. The clays showing the earliest vitrification were the first to reach their max. shrinkage. The mixts. with higher feldspar content vitrify later and shrink less. All showed a lowering of sp. gr. with advance in burning temp. Mixts. contg. feldspar burnt to vitrification showed the lowest sp. gr. (2) Toughness by the Singer impact bending test. The clays alone fired to vitrification showed the highest but most ir-

regular result. Addn. of feldspar lowers the resistance but stabilizes the values obtained. Addn. of iron oxide increases the resistance. (3) Compressive strength. Results similar to (2) but iron oxide reduces strength. (4) Resistance to wear by the Gary sand blast method. The clays alone fired to vitrification as in (2) stood up the best and additions of feldspar lowered and in some cases increased resistance. Iron oxide lowers resistance only very slightly. The outcome of these tests indicated that theoretically the clays alone fired to vitrification showed the highest average in the tests but would occasion mfg. difficulties if used alone. A mixt. contg. 20-30% feldspar and well vitrified is recommended as being the best compromise.

F. A. W.

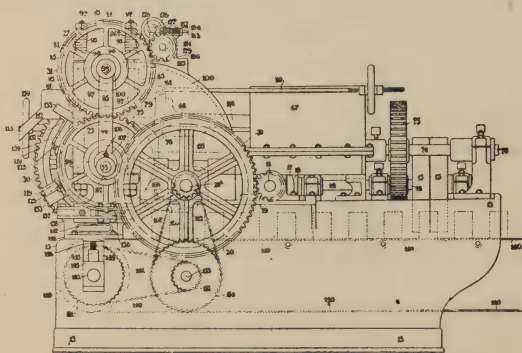
Porcelain clays of Ballarat, Victoria, Australia. R. C. CALLISTER. *Chem. Eng. and Mining. Rev.*, **15**, 26(1922).—There seems little prospect of an extensive indus. in all grades of whiteware manuf. in Victoria, until a china clay indus. has been established. While large quantities of china clays are available, upwards of 8,000,000 T., they are not sufficiently pure to be available for use even after a treatment similar to that given in Cornwall (Eng.). However, ware, if not absolutely white, yet of pleasing tints and with decoration to match, might indicate a way to prepare ware capable of competing with good imported ware.

O. P. R. O.

The German electrical porcelain industry. W. HUTH. *Elektrotechn. Z.*, **45**, 688(1924).—Brief comment on the present status of the indus. C. G. F. (C. A.)

PATENT

Press for the manufacture of hollow earthenware articles. EDMUND WILLIAM LEIGH. U. S. 1,505,042, Aug. 12, 1924. A rotary press for the simultaneous stage by



stage manuf. of hollow earthenware articles, comprising a rotary carrier-head, a series of molding cylinders in said head, a hopper for successively filling each of said molding cylinders with plastic mat., means for subsequently compressing said plastic mat. within the molding cylinder to partly mold the article so as to form a base connected to a thick annular wall both of plastic mat., means whereby said thick annular wall of plastic mat. is

after that subjected to extrusion to form the relatively thin annular wall of the hollow earthenware article, a cradle for supporting the article while it is being extruded and a traveling conveyor to successively receive and remove the completed articles.

Equipment and Apparatus

Apparatus for measuring humidity. KARL HOLZHAUSEN. *Feuerungstechn.*, **12** [17], 141(1924).—Describes various types of instruments used for detg. humidity under the headings (1) app. depending on the phys. change of some mat. such as hair, and gut used as indicators only and not for exact measurements, (2) app. based on the wet and dry bulb principle, (3) thermoelec. app. for distant readings, (4) app. for detg. humidity in hot gases and such contg. impurities such as smoke, dust, etc., (5) continuous registering devices.

F. A. W.

The Ruths steam accumulator. ANON. *J. Soc. Chem. Ind.*, **43**, 765-6(1924).—The principle of accumulating exhaust steam to a partial extent has been used for many years. Johannes Ruth of Stockholm (first pat. 1913) set out on new lines by stor-

ing the steam in heated water. Accumulators with a storage capacity of 25,000–70,000 lbs. of steam are in operation. The advantage from a factory point of view is that the boiler plant can be kept running at a steady steam output and press., while the steam is stored and delivered to the plant as required. The accumulator consists of a large cylindrical container, generally horizontal, with hemispherical ends, built of steel plates; it is almost full of water, to 90.95% capacity, and covered with insulating mat. The steam main, provided with non-return valves, passes under the surface of the water along the length of the accumulator, and has attached 16 branch pipes leading downwards into wide-mouth nozzles which go about to the bottom. The steam passes out through a delivery tube, and the whole is arranged to be automatic. A special form of accumulator is supplied to deliver superheated steam; it consists of 2 containers on the regenerative principle of 1 accumulator for superheated steam and the other for latent heat. The Ruths accumulator is said to foreshadow a radical alteration in the design of steam boilers.

H. H. S.

The Lutelia mechanical excavator. ANON. *Brit. Clayworker*, **33**, 115–6(1924).—A French excavator which digs clay from the bank of clay and loads it into cars or carts is described.

H. G. S.

Aerial ropeways. ANON. *Brit. Clayworker*, **33**, 106–9(1924).

H. G. S.

The determination of ash fusibility. E. MERTENS. *Bull. fed. ind. chim. Belg.*, **3**, 292–301(April, 1924).—A C resistance furnace is described, the heating element of which is a graphite tube 30 cm. long, 3 cm. outside diameter, walls 3 mm. thick, a current of 1 amp./sq. mm. cross-section giving a temp. of 1500° while 2 amp. gives 2000°. Oxidation of the tube is prevented by passing through it 8 l. of N per hr. Ash samples are ground to approx. 175 mesh and molded into tetrahedra with water and a little starch, temps. being measured with an optical pyrometer. The classification of coals by ash m. p. is very briefly mentioned.

W. B. P. (C. A.)

The technic of temperature measurements. KARL HENCKY. *Z. Ver. deut. Ing.*, **68**, 297–301(1924).—Thermometers which measure their own temps. correctly may fail to take up the temp. of the gas or fluid they are measuring. This error is due to heat flow along the thermometer or its inclosing tube, and is frequently, and needlessly, too large to be overlooked. Well-known formulas are applied to det. the amt. of this error in its dependence on dimensions and materials, and tables and curves are given to show the results.

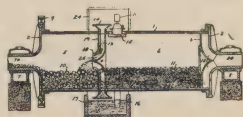
W. P. W. (C. A.)

The measurement of air temperatures in closed spaces by thermometers shielded from radiation. H. HAUSEN. *Z. tech. Physik*, **5**, 169–86(1924).—On the basis of a lengthy theoretical discussion, a complicated formula has been derived by means of which the error in temp. due to radiation may be calcd. Extensive exptl. data are given which agree with those obtained by means of the theoretical formula.

J. H. P. (C. A.)

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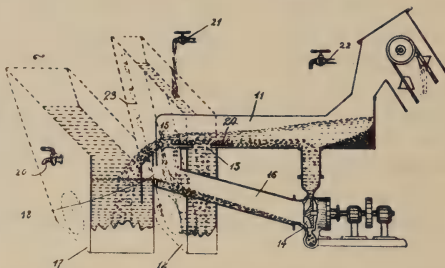
Comminuting mill. RAY C. NEWHOUSE. U. S. 1,504,777, Aug. 12, 1924. In a comminuting mill, a rotary drum, means for introducing mat. into an end of said drum, and an external scoop movable with said drum to introduce mat. from an outside source directly into said drum remote from said end, a portion of said scoop extending transversely of the drum axis and substantially parallel to the drum periphery. In combination, a rotary drum having uniform diam. throughout its length, a partition dividing said drum into a plurality of chambers, comminuting means in each of said chambers, means connected with said partition for delivering reduced mat. from one of said chambers, a stationary receptacle adapted to receive said reduced mat., and means connected with said drum for feeding mat. from said receptacle into another of said chambers.





Comminuting mill. RAY C. NEWHOUSE. U. S. 1,504,778, Aug. 12, 1924. In combination, a rotary drum, an annular screen rotatable with said drum and having side walls, and a spreader located within said screen and between said walls, said spreader being formed to direct mat. delivered from said drum over all portions of said screen.

Apparatus for washing minerals and other substances. RENÉ AUGUSTE HENRY. U. S. 1,505,024, Aug. 12, 1924. An improved app. for washing and sepg. minerals and other substances, comprising, a closed circuit structure, including a main trough, a return trough and connecting conduits for the troughs, a plurality of openings in the main trough, one of which openings leads out of the closed circuit structure, and is used for the heavier particles of mat., another of which openings leads to the return trough and is used for non-sepd. mat., and another of which openings leads to a settling tank, and is used for the lighter particles together with water, the settling tank having an opening connecting with the return trough for leading said water back to the closed circuit structure solely by gravity.



Kilns, Furnaces, Fuels and Combustion

A study of the physical properties of powdered coal of varying degrees of fineness. CHARLES ROSZAK. *Fuel in Science and Practice*, **3**, 161(1924).—In gen. it was found that the finer fractions contd. a slightly greater amt. of ash and of volatile constituents than the coarser fractions. Particles greater in size than 100-mesh usually show a somewhat quadrilateral shape. Finer than this they are more irregular. P. W. K.

New method of producing gas for industrial operations. R. MACLAURIN. *Trans. Ceram. Soc. (Eng.)*, **23**, 121-44(1923-24).—Describes the Maclaurin gas producer which is a large producer 45 ft. high by 8 ft. square. It can be operated for the production of ordinary producer gas or as a gas retort producing coal gas, oil, ammonia, and a large residue of smokeless fuel (soft coke). M. claims it is more economical than other gas producing systems. H. F. S.

New methods in the design of high-duty furnaces for the combustion of lignite. PRADEL. *Feuerungstech.*, **12** [15], 123(1924).—Discusses recent developments leading to the use of lignite as a fuel to take the place of steam coal or anthracite. F. A. W.

Inspection and control of combustion in furnaces. A. DOSCH. *Feuerungstech.*, **12** [13], 107; [14], 116(1924).—Shows that with the customary method of only detg. the CO₂ in the flue gases, a high CO₂ content may not necessarily prove efficient combustion of the fuel but merely indicate a lack of air with the result that considerable quantities of unburned gases are generated. The author describes a practical app. which measures and indicates the draught in the fur. and stack and a certain established ratio between these gives the highest efficiency. F. A. W.

Tunnel kilns for brick. ANON. *Brit. Clayworker*, **33**, 122(1924).—A review of a discussion on this subject which was recently published in *Tonind. Ztg.* H. G. S.

Efficiency in kiln firing. ANON. *Brit. Clayworker*, **33**, 122(1924). H. G. S.

Burning brick with tar. ANON. *Brit. Clayworker*, **33**, 120-1(1924).—The use of tar to burn brick has been tried on the Continent. The tar was stored above the kilns where the heat kept it in a fluid condition and thus allowed it to flow into the kilns.

Any desired temp. can be reached with this fuel, cone 15 having been easily obtained at Eisleben.

H. G. S.

Burning in clamps. ANON. *Brit. Clayworker*, **33**, 102-6(1924).—Different methods of burning in clamps are described.

H. G. S.

Correcting a badly fired kiln. ANON. *Brit. Clayworker*, **33**, 101(1924).—The writer was troubled with overburned ware in top central portion of kiln and underburned ware in the bottom. A more uniform burn was obtained by firing with less coal each time and admitting a little more air over the fires. Firing slower also improved the uniformity of product.

H. G. S.

Combustion of pulverized coal. E. AUDIBERT. *Fuel in Science and Pract.*, **3**, 56(1924).—The time required for complete combustion of various powd. coals under various conditions was studied. Increasing the air up to 40% excess, decreased the time of combustion. Particles between 220- and 240-mesh burned 2 or 3 times as rapidly as those between 120 and 140. The amt. of ash in the coal up to 50% had little effect. In gen. the higher carbonaceous coals burn more quickly than those high in volatile matter. Some coals would not burn except on addn. of some secondary air. Anthracite and coke were burned provided the grinding was sufficiently fine. 3 to 15 cu. m. per ton hr. should be sufficient combustion space. Commercial combustion chambers could be greatly reduced in size if the dust were injected slowly, the area of chamber wall contg. burners reduced in size, or air introduced as secondary air, and the chamber maintained at a higher temp. near the burner.

P. W. K.

Thermal conductivity and specific heat of coal. F. S. SINNATT AND H. MACPHERSON. *Fuel in Science and Pract.*, **3**, 12(1924).—Sp. heat was found to be nearly 0.25 at atmospheric temp. for all coals tested. Of the banded ingredients of coal, clarain was found to have a lower heat condy. than durain which might explain the tendency of many coals to fracture readily on heating.

P. W. K.

Furnace efficiency. ANON. *Queensland Govt. Min. Jour.*, **25**, 261(1924).—Because of lack of modern methods of scien. control the av. net working efficiency is only about 60%. In the working of fur. in the ceram. indus. the efficiency of combustion is very much lower because it is difficult to det. the exact performance of furs. of this character. Tests were undertaken by a firm of fire clay and refrac. mfgs. with the object of detg. on practical lines the exact saving that could be obtained by the use of the "turbine" forced draught steam jet fur. in place of the ordinary bars and natural draught. The tests were carried out on a typical kiln with a content of 15 T. of fire clay products. Under the ordinary conditions of firing the fuel consumption was 2.46 (2500 kilos) of coal and 0.23 (240 kilos) coke, while the total duration of the hgt. was 30-32 hrs. When the turbine fur. was installed, a similar series of tests showed that the fuel consumption was reduced to 1.99 T. (2030 kilos) of coal and no coke, while the duration of hgt. was 20-25 hrs., *i. e.*, by adopting up-to-date methods in this respect, the saving was 0.69 T. (800 kilos) of fuel, or 25% of the total for every firing and the time of hgt. was cut down by 10 hrs. in every 30. The coal used throughout was the same low-grade Belgian quality contg. 20-22% volatile matter, and for the lighting up of the kiln the same amt. of wood was weighed every time. The quality of the products obtained was distinctly superior. The color was more uniform, a fact to which great importance is attached in Belgium, while the total breakages were only 1% as compared with 7% for ordinary methods of firing. This is due to the fact that much less excess air is used with the turbine fur. so that the expansion and contraction of the charge is reduced to a min.

O. P. R. O.

Classification of coal that will enable the buyer to know what kind of coal he is getting. G. H. ASHLEY. *Coal Age*, **25**, 167-71(1924).—This classification is based upon the percentage of fixed C detd. by a "standard analysis" whereby the values are re-

calcd. to a hypothetical 7% ash and the moisture is detd. by drying at 68°F and a pressure of 15 mm. Hg. The following table gives the designations of the various classes:

| Descriptive names | Short name | Code name | Fixed-C range | Water | Vola- tile | Fixed C | Ash | Fuel ratio |
|------------------------------|------------------|-----------|---------------|-------|------------|---------|-----|------------|
| Anthracite | Anthracite | Coal 88 | 83 | 3 | 2 | 88 | 7 | 12+ |
| Semi-anthr. | Semi-anthracite, | Coal 82 | 80-82 | 3 | 7 | 77 | 7 | 12-8 |
| Semi-bitum. | Loervol | Coal 77 | 74-79 | 3 | 13 | 70 | 7 | 8-5 |
| Low-volatile | Lovol | Coal 70 | 65-73 | 3 | 20 | 70 | 7 | 5-3 |
| Medium-volatile | Midvol | Coal 63 | 60-66 | 3 | 27 | 63 | 7 | 3-2 |
| High-volatile gas coal | Hivol | Coal 56 | 53-59 | 3 | 34 | 56 | 7 | 2- |
| High-volatile | Hiervol | Coal 49 | 46-52 | 6 | 38 | 49 | 7 | 2- |
| High-volatile sub-bituminous | Moistvol | Coal 42 | 39-45 | 15 | 36 | 42 | 7 | 2- |
| Sub-bituminous | Himoist | Coal 35 | 32-38 | 25 | 33 | 35 | 7 | 2- |
| Lignite | Lignite | Coal 28 | 25-31 | 40 | 25 | 28 | 7 | 2- |

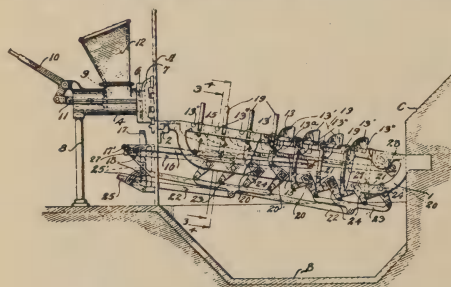
H. L. O. (C. A.)

The application of the electric furnace to the porcelain industry. P. BLOR. *J. four elec.*, 33, 116-8(1924), 2 illus.—The advantages of elec. firing are discussed and a small elec. resistor furnace for 110-220 v. is described. It is similar to muffle furnaces used for rivet heating.

C. G. F. (C. A.)

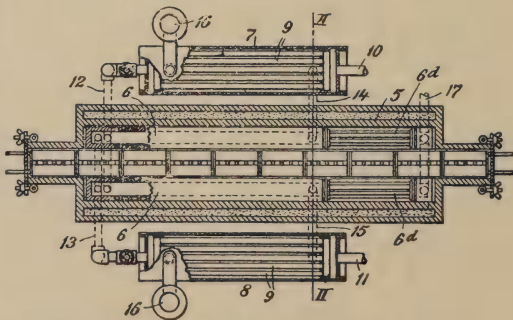
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Hand-operated stoker mechanism for furnaces. JOHN J. BRIDGEFORD. U. S. 1,506,560, Aug. 26, 1924. In fur. stoker mechanism of the class described, an inclined



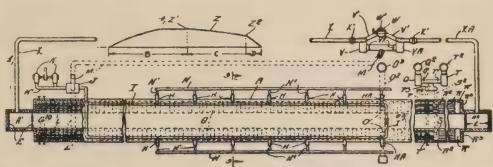
grate comprising a plurality of rocking shaking bars arranged in series and projectable toward the lower end of the grate, means for operating the bars of said series at will, a plurality of plungers arranged at spaced intervals below the plane of the grate bars and mounted to penetrate vertically above said plane, and means for imparting substantially vertical movement to the plungers to cause the same to pass upwardly into the fuel bed.

Tunnel kiln. PHILIP DRESSLER. U. S. 1,506,573, Aug. 26, 1924. In a tunnel kiln the combination of a hgt. means therefor comprising internal combustion chambers, means for supplying fluid mat. to said chambers to maintain combustion therein and means comprising a plurality of outlets from said combustion chambers for regularly preheating said mat. byproducts of combustion withdrawn from said chambers.

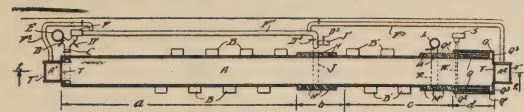


Tunnel kiln and method of operating same. PHILIP DRESSLER. U. S. 1,505,767, Aug. 19, 1924. In a continuous tunnel kiln, the combination with the kiln chamber,

of means for supplying heat to a htg. up and high temp. zone of the kiln chamber and means for regulating the temp. in another zone of the kiln chamber comprising conduits extending along said last mentioned zone, and means for passing either a htg. medium or a cooling medium through said conduits.



Tunnel kiln and method of operating same. PHILIP DRESSLER. U. S. 1,505,768, Aug. 19, 1924. The method of operating a tunnel kiln which consists in maintain-



ing a high temp. zone, an initial cooling zone and a slow cooling or low temp. soaking zone in the order stated between the entrance and exit ends of the kiln by ex-

erting a cooling effect on the rapid cooling zone portion of the kiln and supplying heat to the kiln chamber in each of the other of said zones.

Geology

Chemical exchange reactions of a zeolite. C. J. FRANKFORTER AND F. W. JENSEN. *Ind. Eng. Chem.*, **16**, 621-4(1924); *J. S. C. I.*, **43B**, 652(1924). H. H. S.

Kaolin (South Australia). ANON. *So. Aust. Dept. Mines, Min. Rev.*, [39], 54-8 (1924).—Rept. of the operations of a company (Kaolin, Ltd.) The raw mat. is a very soft argillaceous sandstone; anal. of several samples are given and the details of equipment and operation in the making of fire brick are described. The brick produced is burned at 1450°C, controlled by Seger cones and the product is a white siliceous brick, not very hard owing to absence of vitrification, but ringing well when struck. It is restd. to be in favor among users. Some minor products from the plant are water-glass, ultramarine and kalsomine or cold water paint. O. P. R. O.

Asbestos industry (Russia). N. S. MIKHEIEFF. *Trans. Inst. Econ. Min. and Petrog., Moscow*, [7], 1924.—A treatise of 192 pp. in the Russian language of the development of the indus., the 1st of a series of publications under the heading "Russian Commercial Asbestos," issued by the Inst. O. P. R. O.

Kieselguhr (Transvaal). T. G. TREVOR. *So. African Jour. of Indus.*, **7**, 458 (1924).—Kieselguhr occurs in the Amsterdam Dist., E. Transvaal; in Griqualand West, and Gordonias, as a deposit in the beds of certain small fresh-water marshes. It has been worked only to a small extent, mainly for use in boiler-lining mat. O. P. R. O.

Steatite (So. Africa). T. G. TREVOR. *So. African Jour. of Indus.*, **7**, 461(1924).—Steatite of excellent quality occurs in the Barberton District, and has been noted in other areas. O. P. R. O.

The feldspars of Russia. A. E. FERSMAN. *Matter on the Natural Productive Forces of Russia, Acad. Sci. Petrograd*, **4**, 1-19(1919); *Rev. géol.*, **5**, 178.—A detailed list of occurrences, with mineralogical and technical descriptions. The most valuable deposits are on the west coast of the White Sea and in the Urals. E. F. H. (C. A.)

The state of the talc industry in Russia. A. E. FERSMAN. *Rept. Commiss. on Productive Forces of Russia, 1916*, No. 4, 75-9; *Rev. géol.*, **5**, 178.—The most valuable talc deposits of Russia are in the Caucasus, in the region of Kars, and in the Urals. E. F. H. (C. A.)

Chemistry and Physics

Measuring plasticity of clay. K. PFEFFERHORN. *Brit. Clayworker*, **33**, 120 (1924).—A new method for measg. the plasticity of clay has been devised by P., which consists in dropping a wt. on a clay cylinder $1\frac{5}{16}$ " x $1\frac{1}{16}$ ". The deformation of the clay cylinder is noted and the plasticity number detd. The per cent H₂O in the clay cylinder which is compressed $\frac{1}{3}$ of its original length is called the plasticity no. The foll. table shows the plasticity nos. and mineral compn. of 5 clays:

| | Clay A | Clay B | Clay C | Zettlitz kaolin | Earthenware |
|-------------------|--------|--------|--------|-----------------|-------------|
| Clay substance | 70.2 | 90.6 | 87.9 | 94.2 | 53 |
| Feldspar | 3.7 | 2.0 | 3.4 | 1.8 | 12 |
| Quartz | 26.1 | 6.4 | 8.7 | 4.0 | 33 |
| Plasticity number | 26.6 | 34.0 | 28.0 | 33.5 | 23.2 |

H. G. S.

The distribution of impurities in clays. ANON. *Brit. Clayworker*, **33**, 122(1924).

H. G. S.

New method of preparing thin sections from sand. A. MAMOUROVSKY AND I. SAMSONOFF. *Trans. Inst. Econ. Min. and Petrog.*, 5(1923).—The method here described solves the problem of molding sands into thin sections, thus enabling their investigation by means of the mineralogical microscope. The procedure, minutely described in the Russian text, enables to produce sand-sections possessing following qualities: 1. The Canada balsam used as cementing mass is an amorphous compd. with a constant refraction index. 2. The sections of mineral grains are shaped into parallel-faced plates with the usual thickness of about 0.03 mm. 3. The surface occupied by the balsam is reduced to 10–12% of the square of the section. These properties enable us to apply the highly elaborated and various methods of the mineralogic-petrog. research to the investigation of sands.

O. P. R. O.

Chemical analysis of clays. IAN MARSDEN PORTER. *Indus. Aust. and Min. Stand.*, **72**, 38(1924).—An outline of a method for "ultimate" chem. anal. of a clay, which can easily be followed by any one accustomed to chem. manipulation.

O. P. R. O.

The effect of a current of air on the rate of evaporation of water below the boiling point. J. W. HINCHLEY AND G. W. HIMUS. *Chem. Trade Jour. and Chem. Eng.*, **75**, 94(1924).—It was found exptly. that the wt. of water evapd. in unit time in still air is given by the equation $W = 0.02 (P_e - P_d)^{1.2}$, where P_e is the press. of satd. vapor at the given temp. and P_d is the press. of water vapor in the air used for drying. For drafts up to 0.9 m. per sec., and between 20° and 60°C, the rate of evapn. was found to be $W = a(P_e - P_d)$, where a varies from 0.031 to 0.013 according to the draft.

P. W. K.

Detection of tin and mercury by means of a spot-test. N. A. TANANAEFF. *Z. anorg. Chem.*, **133**, 372–4(1924); *J. S. C. I.*, **43B**, 619(1924).—Filter paper is soaked in mercuric chloride soln. and dried. A drop of soln. contg. stannous tin is placed on the paper and followed by a drop of aniline. Stannous tin is the only metal which will reduce mercuric salts to mercury, giving a black stain, in the presence of such a weak base as aniline.

H. H. S.

Pure alumina from clay.—According to a new process for this manuf. published by Pederson, Norwegian clay is taken and air-dried to 5% water; mixed with chamber acid (sulphuric acid) leaving an excess of clay over acid. After 12 hours the mass is htd. up to 200°C, and then leached at 80°C by a counter-current system. The strong liquor, on cooling, gives $\frac{1}{3}$ of the alumina in the form of alum crystals, and the remaining alumina is pptd. in the same form by adding potassium sulphate. A pure salt can be

prepd. by recrystallizing this alum. The alum is decomposed by ht. so as to give alumina, and sulphate of potash, and, by extracting this mass with water, the insol. alumina is obtained, also the sulphate of potash, which latter is no doubt recovered and used again.

O. P. R. O.

Mullite—a silicate of Al_2O_3 . BOWEN, GREIG AND ZIES. *J. Wash. Acad. Sci.*, **14**, 183(1924).—Mullite, often thought to be sillimanite, has very nearly same properties. Mullite synthesized by Deville using SiF_4 on Al_2O_3 and SiO_2 at red ht. Occurs in nature as inclusions of tertiary intrusives of W. Isles on Island of Mull of Scotland, and Nun's Pass. These have as impurities Fe_2O_3 , TiO_2 and alkalis. There is a 3rd source of occurrence being in crowns of glass pots. The refractive index increases as TiO_2 and Fe_2O_3 content is raised approaching that of sillimanite. Analyses of rock and glass pot crystals are as follows

| | Rock | Glass pot |
|-------------------------|--------------|--------------|
| SiO_2 | 29.04 | 29.36 |
| Al_2O_3 | 69.62 | 69.05 |
| Fe_2O_3 | 0.50 | 0.86 |
| MgO} | .... | 1.12 |
| K_2O | 0.18 | 0.10 |
| Na_2O | 0.06 | .... |
| | <hr/> 100.20 | <hr/> 100.49 |

S. S. C.

Magnetic and electrical properties of the ternary alloys Fe-Si-C. T. D. YENSEN. *Jour. Am. Inst. Elec. Eng.*, **43**, 558-76(1924).—The variations in the magnetic properties of iron and iron alloys, even of supposedly constant composition, have been puzzling to the users and investigators of ferro-magnetic mat. ever since the introduction of such mat. for elec. app. Y. started to investigate this problem over 10 yrs. ago at the U. of Ill., and has continued it at the Westinghouse Research Lab. since 1916, concentrating on iron and iron-silicon alloys. While the results obtained do not eliminate 100% of the difficulties, they go a long way in that direction. It has been found that carbon is largely responsible for the variations, because of the fact that amts. so small as previously to be regarded as traces (less than 0.01%) remain dissolved in the iron in the solid state, even after slow cooling, and have a tremendous influence on the magnetic properties. Of much less effect is carbon pptd. as pearlite, free cementite and graphite, the effect being in the order named. If the effect of dissolved carbon be represented by 100, the effect of carbon as pearlite is 16.5, of carbon as Fe_3C 2.25, and of carbon as graphite nearly nil. The form assumed by carbon—aside from the carbon in soln.—depends largely on the silicon content, and can best be explained by referring to Fig. 9. Besides carbon, it has been found that the grain size has a large and definite influence on the magnetic properties, due to the accompanying intercrystalline amorphous cement that may be regarded as an impurity similar to other intercrystalline impurities. The detrimental effect of sulphur, phosphorus and manganese on pure iron is in the order named, while phosphorus has a beneficial effect on high silicon alloys. The evidence obtained is to the effect that the increased reluctivity, coercive force, or hysteresis loss, due to carbon and other impurities that are pptd. combined with iron—including in this class the intercrystalline cement—is caused by the inherent corresponding property of these pptd. impurities. Regarding the tremendous effect of carbon in soln., it is suggested that this is due to the entering of carbon into the more or less stable equilibrium arrangement of the ferro-magnetic structure, upsetting this equilibrium arrangement.

A. F. G.

Range of the mixed-crystal phase rich in aluminium in the quaternary system aluminium-magnesium-silicon-zinc. W. SANDER AND K. L. MEISSNER. *Z. Metall-*

kunde, **16**, 12-7(1924); cf. *C. A.*, **18**, 1077.—The amts. of Zn, Mg, and Si which Al can hold in solid soln. increase from 8%, 2%, and 0.5%, resp., at 20° to 65%, 12%, and 0.8%, resp., at 450°; consequently all Al alloys contg. quantities of these elements between the above limits will deposit them partly on cooling slowly. If the cooling is rapid, this action is suppressed, but takes place slowly at the ordinary temp., and is accompanied by a gradual increase in vol., hardness, and tensile strength. The equil.-diagram of the quaternary system Al-Zn-Mg-Si is developed from a consideration of those of the 4 ternary systems involved. B. C. A. (*C. A.*)

Constitution of ternary aluminium alloys. V. FÜSS. *Z. Metallkunde*, **16**, 24-5 (1924).—In the 15 possible ternary systems comprising Al and 2 of the elements, Fe, Cu, Ni, Zn, Mg, and Si, the Al corner of the ternary diagram is intersected by a quasi-binary line only in the cases in which the addn. of the 2 elements to Al has a specifically new influence on its properties, namely, in the systems Al-Mg-Si, Al-Mg-Zn, and Al-Mg-Cu. Al decomposes the silicides of Fe, Ni, and Cu, liberating free Si and forming intermetallic compds., and addn. of any of these elements or of Zn to Al results in the formation of these compds. B. C. A. (*C. A.*)

The determination of the coefficient of expansion of metals and other materials of construction by means of the Marten mirror apparatus. H. SIEGLERSCHMIDT. *Mitt. Materialprüfungsamt*, **40**, 215-33(1922); cf. *C. A.*, **16**, 4166.—The measurements were made in such a way that the errors reported in the previous article were avoided. The coeff. of expansion of hot-pressed, cold-drawn and cold-rolled specimens of brass contg. 58% Cu, 2.5% Pb and the remainder Zn was measd. at temp. from 20° to 450°. The values found at 250-300° were always smaller when measd. during the heating than during the cooling of the specimen. Over the range 300-50° the reverse was true. Measurements of the coeff. of expansion for cast Al rods and hard-drawn Cu and bronze wire are also given. F. P. F. (*C. A.*)

Researches at high temperatures. XVII. The vapor pressures of the alkaline earth metals. OTTO RUFF and HELLMUTH HARTMANN. *Z. anorg. allgem. Chem.*, **133**, 29-45(1924).—The vapor pressures of Mg, Ca, Sr, and Ba were detd. in an atm. of A by an improvement of the method of Ruff and Bergdahl (*C. A.*, **13**, 3054). The b. p. at 760 mm. as detd. by extrapolation of the exptl. vapor-pressure curves are: Mg, 1086°; Ca, 1175°; Sr, 1151°; and Ba, 1146°. The mol. heats of vaporization λ_s as calcd. (I) by Liempt's formula, and (II) from the b. p. by de Forcrand's formula are: Mg, (I) 43,500, (II) 30,900 cal.; Ca, (I) 85,000, (II) 33,100 cal.; Sr, (I) 84,700, (II) 32,500 cal.; Ba, (I) 83,100, (II) 32,400 cal. The lower (II) values are considered to be more probable. The calcd. heats of vaporization at 0° abs. are: Mg, (I) 47,300, or (II) 34,600 cal.; Ca, (I) 90,500, or (II) 38,400 cal. In order that equil. in which these metals occur as a gaseous phase may be calcd. by the Nernst heat theorem, the chem. const., $C = 0.14\lambda_s/T_s$, was calcd.: Mg, (I) 5.61, or (II) 3.18; Ca, (I) 8.34, or (II) 3.20; Sr, (I) 8.34, or (II) 3.19; Ba, (I) 8.21, or (II) 3.19. From Guldberg and Guye's relation, $T_{crit.} = 1.55 T_s$, the crit. temps. are: Mg, 2100°; Ca, 2200°; Sr, 2175°; and Ba, 2150°. These values are only approx. as this relation has not been confirmed for such high boiling substances. MgO volatilizes on amorphous C at about 1500°, and on graphite at about 1800°. Above 1800° the reaction is so active that with small pieces of MgO the Leidenfrost phenomenon occurs. Its volatility is therefor greater from the more reactive form of C. That this is due to the reduction of MgO to Mg by the C at a relatively low temp., and to the relatively high vapor pressure of Mg, is substantiated by calcn. from the above data. R. H. L. (*C. A.*)

The melting point of graphite. ANON. *Nature*, **114**, 173(1924).—Expts. to det. the m. p. of graphite have been made by Ryschkewitsch and consisted in passing a heavy current through a graphite rod with constriction. At a certain temp. this constricted

portion suddenly disappears, and kinematography shows that this is not due to a gradual evapn. The temp. was also practically independent of press. Calcn. shows that the m. p. of graphite is about 3800° abs. *Chem. Zeit.* (July 15) gives an abstract of this paper on the m. p. of graphite, which was read at the Bunsen Gesellschaft at Göttingen in May.

O. P. R. O.

Alumina from clay. H. SPECKETER. *Zeits. für Phys. Chem.*, **110**, 637-55(1924).—Shows that Germany will be able to supply its own aluminum ore in the future, as a result of recent work. The HCl process is preferable to the H_2SO_4 process.

H. H. S.

BOOK

Report on Radiation and the Quantum Theory. J. H. JEANS. 2d. Ed. Pp. 86. London: Fleetway Press, Ltd. Price 7 s. 6 d.

H. H. S.

PATENTS

China clay for pottery manufacture. T. M. STOCKER. Brit. 214,062, March 17, 1923. A suspension is formed of china clay in H_2O contg. a small proportion of Na silicate. The suspension is allowed to stand until 50-80% of the clay has settled out and the fine clay remaining in suspension is collected by use of a filter-press and may be washed and dried.

(C. A.)

Method of preparing siliceous material. FRANCIS X. GOVERS. U. S. 1,506,118, Aug. 26, 1924. The method of prepg. silicic acid which comprises preparing a colloidal soln. of silicic acid and removing water therefrom before a "gel" has formed, the removal of water being carried to the extent that the solid product will not form a solid "gel" in the presence of water.

Process for production of aluminum chloride and other products from carbonaceous shales and like material. EDSON R. WOLCOTT. U. S. 1,506,104, Aug. 26, 1924. The process of making aluminum chloride comprising reacting with chlorine upon a residue derived from heating a carbonaceous argillaceous mineral, said residue comprising aluminous material and carbon.

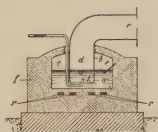
Titanium compound. JOSEPH BLUMENFELD. U. S. 1,504,669, Aug. 12, 1924. In the process of producing titanium oxide from mat. contg. titanium, the steps of mixing the said mat. with sulphuric acid, heating the mixt. initially to a temp. of at least $130^{\circ}C$ and gradually increasing the temp. to a max. of $220^{\circ}C$, treating the resulting mat. with water in such propns. as to produce a soln. contg. about 15 to 25% of TiO_2 , and subjecting that soln. to hydrolysis while avoiding the presence of any substantial amt. of ferric iron therein.

Titanium compound. JOSEPH BLUMENFELD. U. S. 1,504,670, Aug. 12, 1924. In the process of producing cryst. titanyl sulphate from mat. contg. titanium, the steps of mixing the said mat. with sulphuric acid, htg. the mixt. initially to a temp. of at least $130^{\circ}C$ and gradually increasing the temp. to a max. of $220^{\circ}C$.

Titanium compound. JOSEPH BLUMENFELD. U. S. 1,504,671, Aug. 12, 1924. A process of producing titanium oxide from titaniferous mineral consisting in decomposing the mineral with not substantially more than 1 to 2 parts of sulphuric acid of about 80% strength, and treating the resulting mass with not substantially over 3 parts of water, while maintaining the mass at an approx. constant temp. near to the b. p. of the liquid until the titanium oxide is pptd., while any iron compound in the soln. is maintained in the ferrous state, and sepg. the oxide from the mother liquor and residue, substantially as described.

Preparation of titanium hydroxide. JOSEPH BLUMENFELD. U. S. 1,504,672, Aug. 12, 1924. The prepn. of titanium oxide or hydroxide by hydrolytic precipitation which comprises diffusing titanium from one soln. into another under the action of differential concn. and temp., and allowing the diffusion action to continue for several minutes before mixing the soln.

Method of preparing siliceous material. FRANCIS X. GOVERS. U. S. 1,504,549, Aug. 12, 1924. The method of prepg. silicic acid, which comprises forming a jelly-like mass of colloidal silicic acid, drying the mass with the impurities therein until it will no longer revert to its prior gelatinous colloidal form in the presence of water, washing the dried material and again drying it.



Process for manufacturing oxide of white antimony. ANTONIN GERMOT. U. S. 1,504,685, Aug. 12, 1924. A process for making pure Sb_2O_3 suitable for the manuf. of paints and free from higher oxides, comprising blowing an oxygen contg. gas into a bath of molten antimony which is held in a closed chamber, and collecting the thus formed clouds of oxide of antimony in receiving chambers.

Purifying china clay. L. A. HOLDEN. Brit. 214,699, Jan. 19, 1923. To remove brown coloration from china clay it is suspended in a soln. of Na sulfide or other alk. sulfide and dil. H_2SO_4 is then added until the mixt. is nearly neutral. After 5 or 6 hrs. more H_2SO_4 is added to dissolve out the FeS formed and ppt. the clay, which is then repeatedly washed with H_2O . The last washing may contain sufficient $\text{Ca}(\text{OH})_2$ to neutralize acidity. (C. A.)

General

Physical properties of materials. I. Strengths and related properties of metals and wood. Bureau of Standards, *Circular No. 101*.—The circ. represents a compilation of the most probable values, from a testing engineer's viewpoint, for the tensile, compressive, and shearing strength; ductility; modulus of elasticity; and other related properties of pure metals and their alloys, and of wood. In addn. to these, and whenever the existing data warranted, the circular gives the properties of metals at elevated temps. and their fatigue and impact properties. Values for other phys. props. include those for sp. gr., m. p., and the coeff. of expansion. Properties and uses of less commonly used metals are described briefly. Graphical representation is used in many cases to show the effect of ht. treatment, temp., and other conditions on the properties of a mat. References to the sources are given for all values in the circular. These include the exptl. results published in Amer. and European tech. periodicals, the specif. of tech. societies and of Govt. departments and unpublished results of the Bur. of Stand.

H. F. S.

Researches on the theory of fine grinding. GEOFFREY MARTIN, CHAS. E. BLYTH AND HAROLD TONGUE. *Trans. Ceram. Soc. (Eng.)*, **23**, 61–120(1923–4).—The research was carried out in the lab. of the Brit. Port. Cement Assn. with the financial assistance of the Privy Council for Financial and Indus. Research. The work was part of a program extending over $2\frac{1}{2}$ yrs. The raw mat. was crushed sand and the grinding machine was an 18" x 18" exptl. tube mill. The treatment of the data is highly mathematical. Briefly stated, it was found that the growth of the number of particles with decrease of diam. follows the law by which money grows at compd. interest. The law is probably the expression of the fact that crystals have a definite and fixed structure and consequently break up in the same regular and definite manner all down the scale of magnitude. Thus each set of particles breaks down in the same way so that the product (number of particles) produced by the breaking down of a small particle is, if sufficiently magnified, merely an image of the product produced by the breaking down of a large particle. Thus if sand of mean diam. d breaks down to give 2 particles of mean diam. d then each particle of d will break down to give 2 particles of an equidistant mean diam. d_2 and each particle of diam. d_2 will in turn break down to give 2 particles of an equidistant mean diam. d_3 , etc.

H. F. S.

Rotary steam boiler. WINTERMEYER. *Feuerungstech.*, **12** [15], 127; [16], 137 (1924).—Describes the "atmos" superpress. boiler operg. under a press. of from 750–

900 lbs. per sq. in. which shows remarkable efficiency in opern. The shell is a seamless or welded tube rotating on its axis at about 300 r.p.m. which ensures absolutely uniform htg. throughout and obviates dangers arising from unequal expansion and contraction of the parts. The feed water is introduced in the center of one end and the steam taken off at the center of the opposite end. Another type has a stationary shell with internal horizontal paddles which in rotating carry the water around the circumference of the shell. Sketches show in detail methods used for automatically keeping the water level constant and an arrangement of safety check valves which instantly seal the in-and-outlet in the event of the shell exploding. One of these boilers has been operating in a sugar refinery in Sweden for 2 yrs. with marked success.

F. A. W.

Natural steam wells in Larderello. OKRASSA. *Feuerungstech.*, 12 [18], 149; [19], 157(1924).—Describes the harnessing of these natural steam wells in Italy for elec. power and light purposes.

F. A. W.

Annual report of H. M., Chief Inspector of Factories and Workshops for the year 1923. *Jour. Soc. Chem. Ind.*, 43, 771-3(1924).—*Lead poisoning.* In 1923 there were 11 deaths in potteries, and 5 not fatal cases in vitreous enameling shops. *Manganese poisoning.* The first definite cases of manganese poisoning in England are recorded this year. *Natural lighting of factories.* A new method of giving a good daylight illumination toward the center of wide buildings depends on refraction. The light is thrown horizontally across the room, no matter in what direction it falls on the outside of the windows, by means of "prismatic glass," the surface of which is ridged vertically at angles of 30° or 45° or 60°.

H. H. S.

The making and burning of glazed ware. ANON. *Brit. Clayworker*, 33, 98-9 (1924).—The prepn. of glazes for whiteware, hard glazes, soft glazes and colorless glazes on white bodies are described.

H. G. S.

International conference, applied mechanics. *Jour. Soc. Chem. Ind.*—The first International Conference of Applied Mechanics was held at Delft, Holland, April 22. The sections were elasticity, mathematics, and hydro-dynamics. Among other papers Griffith illusd. his theory of rupture by expts. on vitreous silica fibres; Prandtl treated of problems arising from plastic deformation; Haigh studied rupture through fatigue from the standpoint of thermodynamics. The next conference will be at Zurich, Switzerland, in 1926.

H. H. S.

Unfair competition. *Jour. Soc. Chem. Ind.*, 43, 767(1924).—The federation of Brit. Indus. has set up a Comm. to consider the subject and to draw up recommendations to the Govt. with a view to consideration by Experts of the Economic Comm. of the League of Nations at Geneva in reference to the revised text of draft Articles of Convention on Unfair Competition.

H. H. S.

Manufacture of ceramic wares (Union of So. Africa). JOHN ADAMS. *So. Af. Jour. Indus.*, 1, 763-75(1918).—The subject ably discussed under the foll. headings: classification; principles of manuf.; historical sketch; present time, bricks, floor tiles and roofing tiles; fire clay, stoneware and silica goods; general earthenware and glazed tiling; future development. The article concludes with a bibliography. O. P. R. O.

Building materials (British Columbia). ANON. *Rept. of the Minister of Mines*, (1923).—Total output of structural mat. amtd. to \$2,809,292—mostly from the Coast District. Excellent building-stone is found in abundance all over the Province and there are several well-equipped quarries along the coast; production of 1923. The sale of red brick in 1923 about 7800 M; the price varying from \$12 to \$16 a thousand. There is but one company producing fire brick at Clayburn. The manuf. of lime is small, but an increased demand for crushed rock and gravel.

O. P. R. O.

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CERAMIC ABSTRACTS

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Abrasives

Manufacturing an artificial abrasive. ANON. *Chem. Met. Eng.*, **31**, 501-3(1924).—The manuf. of carborundum is described. Coke, sand, salt and sawdust are charged into a U-shaped elec. fur. A core of graphite through the center of the charge carries the current. After 36 hrs. the charge is cooled and sorted. There is a top crust of unconverted charge, an intermediate layer of partly converted mix. known as firesand,

¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the Editor of *Chemical Abstracts* by cooperative agreement.

and inside, the pure carborundum. The large chunks of carborundum are crushed in pan crushers, digested with acid to remove harmful ingredients, washed, dried, and sized into 21 grades.

M. E. M.

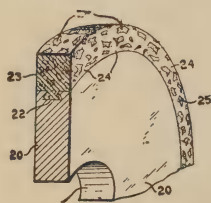
Making vitrified abrasive wheels. ANON. *Chem. Met. Eng.*, **31**, 531-3(1924).—Describes the manuf. of carborundum grinding wheels. Two methods are used: wet process and dry press. In the latter, the carborundum particles are tumbled in barrels with the bonding mat. for several hours. Water is then added till the mix has the consistency of molding sand. The wheels are pressed in steel molds by hydraulic presses and dried for several days before firing. In the wet process, the mats. are mixed with water to a thin paste, stirring for many hours. The stirrer is designed to eliminate admixture of air bubbles. The mix is transferred to metal molds lined with heavy paper, and worked by hand to eliminate air bubbles, then dried. The wheels are fired in down-draft, coal fired kilns in fire clay saggars. The firing cycle is 2 weeks. The fired wheels must next be dressed to size, and balanced before their final inspection.

M. E. M.

Manufacture of artificial abrasives in the electric furnace. C. J. BROCKBANK. *Birmingham Metallurgical Soc. Jour.*, **7**, 551-9(1924).—This article discusses the early history, manuf. and finishing of silicon carbide; aluminous abrasives or artificial corundum and manufacturing costs. It is illustrated and contains tables of analyses. O. P. R. O.

PATENT

Polishing wheel. CLARENCE R. KING. U. S. 1,507,836, Sept. 9, 1924. An abrasive article comprising a resilient cushioning body and spaced teeth of bonded abrasive grains united therewith.



Art

Color measurement with Lambert's mirror. HEINRICH TRILLICH. *Farben-Ztg.*, **28**, 1601-2(1923).—A very brief biography of Johann Heinrich Lambert (1728-1777), with a description of his mirror, which consists of a plane parallel glass plate set vertically across the center of a horizontal plate equally illuminated on all parts. Colored cards placed on the horizontal plate on opposite sides of the plane parallel glass will show varying degrees of transmission and reflection depending on the angle of observation of the glass. Expts. with this mirror on some of the colors making up Ostwald's color circles, show that it can be used for demonstrating color mixing, complementary colors, etc., and for the measurement of colors.

F. A. W. (C. A.)

PATENT

Manufacture of cement, burned lime, etc., in electric furnace. T. A. F. HOLMGREN. Swed. 50,536, Jan. 4, 1922. The raw materials are crushed into suitable grain sizes, mixed and fed into an elec. furnace. The heat is produced in one or more zones by a. c. which is applied through one or more circuits with phase-differences like 360° divided by the no. of circuits. Gas is drawn or forced through the furnace in opposite direction of the materials.

(C. A.)

Cement, Lime and Plaster

How silica cement is made. P. H. JUNG. *Chem. Met. Eng.*, **31**, 465-7(1924).—Silica cement is used for laying silica brick. It is made from crushed silica bats and a high quality plastic clay in the ratio of about three to one. Crushed ganister is sometimes added, but is unnecessary. The clay used must be low in iron and alkalis. A typical anal. is given. The raw mat. may be crushed sep., then mixed and ground, or mixed, then crushed and ground. The 1st method is preferable. The mixt. is generally ground in ring roll pulverizers, and screened on inclined screens. If too fine a screen

is used, there is a tendency for the silica and clay to sep. The 3 most important tests for the finished product are fineness, fusion point and plasticity. M. E. M.

Concrete factory chimneys. *S. African Jour. of Indus.*, 7, 503(1924).—A new method of constructing factory chimneys in concrete depends on the use of hard burnt tile and steel reinforcement in the shape of vertical bars and horizontal rings. The tile form the inner and outer walls and serve as permanent molds for the concrete. Being of comparatively small size, the tile also ensure that the concrete is placed carefully in small quantities, while the steel reinforcement gives resist. to wind-pressure and to cracking through temp. changes. In bldg. a chimney in accordance with this method, the foundation is put in with requisite reinforcement of vertical bars extending upwards, and an inner and outer ring of tile are set in mortar. The annular space is then partly filled with concrete, the circular reinforcement rings placed in position, and the filling continued level with the tile. Another row of tile is then laid as before, and the process continued, each course breaking joint with the next, and the joints being afterwards pointed in the same way as brickwork. It is claimed that with careful workmanship this method will produce a sound structure which is safe and durable, calling for the minimum of repairs and giving the max. of economy and permanence. (*London, Times Eng. Supp.*) O. P. R. O.

Sand-lime brick process. ANON. *Indus. Australian and Min. Stand.*, 72, 296 (1924).—The value of sand-lime brick is equally proved by means of chem., mech. and phys. tests. Thus they have greater resist. to crushing strain than ordinary brick, and are less absorbent to water, while possessing equal porosity to the air. All are perfectly straight and of equal size, there being no twisting, bulging, or distortion, so that less mortar is required to lay them, and it is easier to obtain efficient results with plaster because of the smooth surface given. The process of manuf. is simple and can be carried out with unskilled labor. Mix sand intimately with 5 to 10% of thoroughly slaked lime, forming this into a semi-dry mass with water, passing it through a brick molding mach. operg. at 2 T. per sq. in. press., and then ht. for 10 hrs. in closed cylinders at a temp. of approx. 350°F under a steam press. of about 120 lbs. per sq. in. Under these circumstances a chem. reaction takes place between part of the silica and the lime, resulting in the formation of hydrated calcium silicates, which bind the whole mass together, forming an intensely hard, close-grained and homogeneous brick which somewhat resembles stone. The entire process can be completed, from raw mat. to finished brick in 24 to 36 hrs. in striking contrast to the many months of aging necessary in case of ordinary fired clay brick; the sand-lime method is in general cheaper, and has the advantage that sand occurs almost everywhere, while suitable clay does not. The lime should not contain the slightest trace of unslaked lime lest the brick expand, become distorted, weak and friable. If the lime is properly slaked, sand-lime brick is unquestionably superior to ordinary brick. O. P. R. O.

Cement manufacture possibilities in crown colonies. ANON. *Bull. of Imp. Inst.*, 22, 173-93(1924).—The possibilities for cement manuf. in many Brit. possessions and the importance of utilizing local supplies has been investigated. For this purpose a lab. has been established with plant necessary for (1) the mech. prepn. of large samples of raw cement mat., (2) the carrying out of exptl. firing trials, and (3) the testing of the finished cement in order to ascertain whether it conforms to the standard specif. The article gives an outline of the manuf. and properties of different kinds of cement, special attention being devoted to the charac. required in raw mat. for the several classes of cement used in building. This is followed by particulars relating to the possibilities of cement manuf. in the various Colonies and Protectorates and an acct. is given of the deposits so far known and the results of tests conducted at the Imp. Inst. lab. O. P. R. O.

Contribution to the knowledge of the hydration process in the setting of Portland cement and of clinker. HANS PULFRICH AND G. LINCK. *Kolloid-Z.*, **34**, 117-9(1924).—Previous observers working with a large excess of H_2O have noticed during the setting of cement the formation of needles of a Ca silicate, then hexagonal plates of Ca aluminate, and finally the disappearance of the crystals with formation of a gel. In the hydration of clinker the hexagonal plates appear first, then the gel and crystals of $Ca(OH)_2$. The hexagonal plates were made synthetically by melting together $3CaO$ and Al_2O_3 and treating with H_2O . The crystals proved to be $3CaO \cdot Al_2O_3 \cdot 7H_2O$. The needles were also synthesized by making the tricalcium silicate by melting together $CaCO_3$ and SiO_2 and treating with H_2O . They can also be prepd. by treating a 5% SiO_2 soln. with $Ca(OH)_2$ soln., warming on the water bath and letting stand for a week. On prolonged standing both types of crystals decompose again to form a gel. When the amt. of H_2O added to the cement is cut down more nearly to the proportion used in practice by employing mixts. of glycerol and H_2O in place of H_2O alone for making the microscope slides it is found that the setting of the cement takes place without the formation of the needles, the reaction proceeding at once to the gel stage. It is, therefore, concluded that the hardening of cement is due to the formation of the gel rather than to the interlocking of the needle-like crystals.

F. L. B. (C. A.)

The Segni (Rome) cement plant. F. FERRARI. *Cemento* **20**, 101-5(1923); *Chimie et industrie*, **11**, 1140(1924).—A description of the plant.

A. P.-C. (C. A.)

Enamel

Principles of enameling. I. H. F. STALEY. *The Ceramist*, **4**, 6(1924).—The 1st of a series of articles for the special benefit of the man who has not had tech. training. The methods of calcg. melted wt. and percentage loss on melting, and coeff. of expansion without the use of chem. symbols are shown.

C. W. P.

PATENTS

Production of a non-chipping enamel. R. MADES. Ger. Pat. 396,752, Dec. 29, 1922. (*Jour. Soc. Chem. Ind.*, **43B**, 788(1924).) The ground coat is applied in so dilute a condition that after firing it is invisible to the naked eye. Thus the finished ware can be subjected to very considerable shocks and blows.

H. H. S.

Enamel paint. F. SCHAMBERGER. Ger. 376,569, *Oil & Color Trade Jour.*, **66**, 1052(1924). The sap of the shells of the oil-fruit seeds of *Anacardium occidentale* or *A. orientale*, or a mixt. of both, is used, with or without addn. of drying, binding, and hardening agents.

O. P. R. O.

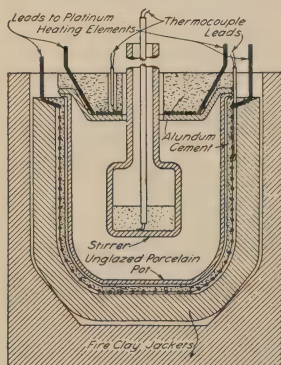


FIG. 1.—Diagram showing arrangement of parts of viscosimeter, heating circuits, and thermocouples.

Glass

The viscosities and surface tensions of the soda-lime-silica glasses at high temperatures. Part I. Viscosities of glasses at high temperatures. EDWARD W. WASHBURN AND GEORGE REED SHELTON. Univ. Ill. Eng. Expt. Station, *Bull.* **140**, April 14, p. 8-50 (1924).—*Method.* The method adopted was that of rotating cylinders, the glass being contained in an approx. cylindrical porcelain pot into which was dipped a hollow porcelain stirring cylinder. The latter was rotated at a measured speed by means of a system of falling wts. For a given apparatus employing a const. height of liquid, the simplified equation (2) holds

$\eta = k \frac{W}{S}$, where η is viscosity of the liquid, W the mass of the falling wt. which rotates the inner cylinder in the glass at S r.p.m., and k a const. of the apparatus which is detd. by calibration with liquids of known viscosity. *Standardizing liquids.* A series of glasses were prepared by mixing in proper proportions: water, dextrose and confectioner's glucose. A wide range of viscosities were thus obtained. The viscosities of these liquids were detd. by (1) the capillary-flow method, using viscosimeters of the Ostwald type, (2) the falling sphere method, using nickel-chromium steel balls and small drops of mercury, and (3) Washburn's capillary-penetration method. The compns. and viscosities of the standardizing liquids are given in Table 10.

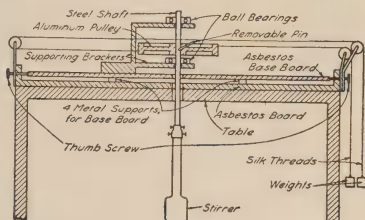
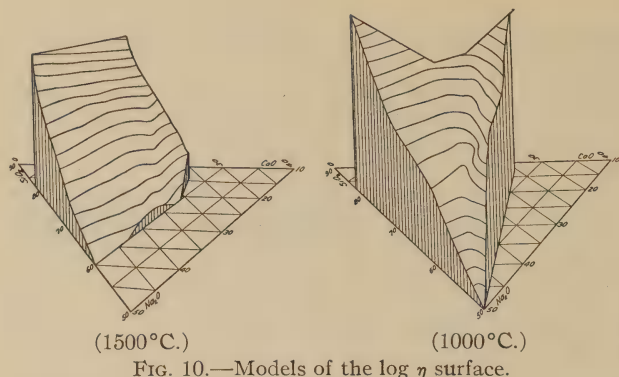


FIG. 2.—The driving mechanism.

TABLE 10
SUMMARY OF VISCOSITIES OF VISCOUS LIQUIDS
Values in parentheses are taken from the literature

| No. | Description of solution | Temp., deg. C | Capillary methods | | Falling-sphere method | | Value from curve of Fig. 7 | |
|-----|------------------------------------|---------------|-------------------|-------------|-----------------------|-------------|----------------------------|-------------|
| | | | η | $\log \eta$ | η | $\log \eta$ | η | $\log \eta$ |
| 1 | 60% Sucrose | 24 | (0.4638) | (-0.6663) | ... | ... | ... | ... |
| 2 | 60% Sucrose | 0.3 | (2.330) | (0.3674) | ... | ... | ... | ... |
| 3 | 80% Glucose | | | | 3.442 | 0.5369 | | |
| | $d^{25^\circ}/_{25^\circ} = 1.331$ | 25 | 3.696 | 0.5677 | 3.388 | 0.5299 | 3.43 | 0.535 |
| | | | | | 3.531 | 0.5479 | | |
| | | | | | 4.186 | 0.6218 | | |
| 4 | Castor oil | 24.8 | (6.62) | (0.821) | ... | ... | ... | ... |
| 5 | Castor oil | 21.75 | (8.50) | (0.930) | ... | ... | ... | ... |
| 6 | 90% Glucose | | | | 35.99 | 1.5562 | | |
| | $d^{25^\circ}/_{25^\circ} = 1.379$ | 25 | 36.62 | 1.5637 | 35.29 | 1.5477 | 36.6 | 1.562 |
| | | | | | 35.50 | 1.5502 | | |
| 7 | 98% Glucose | | | | 749.3 | 2.8747 | | |
| | $d^{25^\circ}/_{25^\circ} = 1.420$ | 25 | ... | ... | 743.5 | 2.8713 | 764 | 2.883 |
| | | | | | 772.0 | 2.8876 | | |
| 8 | 100% Glucose | | | | 5 699 | 3.7558 | | |
| | $d^{25^\circ}/_{25^\circ} = 1.436$ | 25 | ... | ... | 5 314 | 3.7254 | 3 000 | 3.475 |
| | | | | | 5 287 | 3.7232 | | |
| 9 | Glucose and Dextrose | 19 | 13 620 | 4.1342 | 13 460 | 4.1291 | 16 600 | 4.220 |
| | $d^{25^\circ}/_{25^\circ} = 1.447$ | | | | 13 440 | 4.1284 | | |
| | | | | | 13 870 | 4.1418 | | |
| 10 | Glucose and Dextrose | | | | 163 300 | 5.2130 | | |
| | $d^{25^\circ}/_{25^\circ} = 1.470$ | 18.9 | 165 900 | 5.2199 | 163 300 | 5.2130 | | |
| | | | | | 165 000 | 5.2175 | 163 000 | 5.212 |
| | | | | | 167 600 | 5.2243 | | |

The viscosities are given in *poises*, the poise being the tangential force per sq. cm. of area of either of two horizontal planes one cm. apart, one of which is fixed, while the other moves with unit velocity, the space being filled with the viscous liquid of unit viscosity. *Variation of the constant k in equation (2) with the viscosity of the liquid.* A brass app. was used consisting of two concentric hollow brass cylinders, the inner cylinder rotating within the outer one on bearings. The space between was filled with

FIG. 10.—Models of the $\log \eta$ surface.

stirring friction viscosity as measured by the rotating-cylinder method is identical with the viscosity as measured by capillary or by falling-sphere methods, only as long as the viscosity does not exceed a certain value, possibly depending upon the dimensions of the rotating-cylinder apparatus. The value of k varied from 70 to 353, depending on the viscosity of the liquid. The caution is added that in measuring the viscosities of very viscous liquids by the rotating-cylinder method it is advisable to standardize the apparatus with a series of liquids of known viscosities, covering the range desired.

Calibration of porcelain pots and stirrers. For each standardizing liquid, placed in a porcelain pot with stirrer in position, the straight line relationship between different

the liquid, and the const. k of the apparatus was detd. from the velocity attained by the inner cylinder, actuated by falling wts. From the results it is concluded that regardless of the viscosity of the liquid employed, the rate of shearing is directly proportional to the torque, but that the

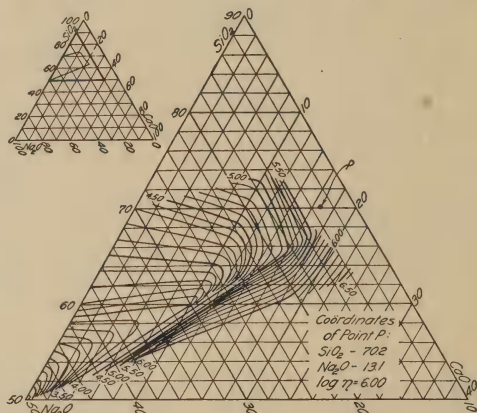


FIG. 12.—Log isokoms at 900°C.

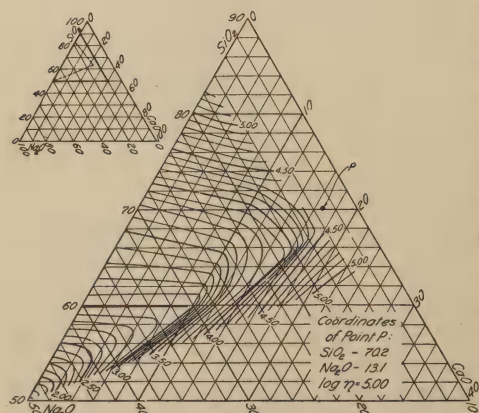


FIG. 13.—Log isokoms at 1000°C.

falling wts. and the corresponding r.p.m. values were determined. The logarithms of the values of the slopes $W/r.p.m.$ were plotted against the logarithms of the corresponding viscosities of the standardizing liquids. By detg. the values of $W/r.p.m.$ for any unknown liquid, the viscosities can then be obtained from the curve.

Viscosities of the soda-lime-silica glasses. By mixing three stock glasses of known compn. the following glasses were obtained, and investigated (Table 15). Chem. analyses of the stock glasses and of two mixtures indicated the slight variations in compn. due to melting. All the glasses contained small quantities of alumina, less than 1% in most cases.

TABLE 15
COMPOSITIONS OF GLASSES INVESTIGATED

| Glass no. | Per cent of weight | | |
|-----------|--------------------|-------------------|-------|
| | SiO ₂ | Na ₂ O | CaO |
| 1 | 49.7 | 50.3 | ... |
| 2 | 82.6 | 17.4 | ... |
| 3 | 70.0 | 30.0 | ... |
| 4 | 60.0 | 40.0 | ... |
| 5 | 63.0 | 13.6 | 23.4 |
| 6 | 60.5 | 20.0 | 19.5 |
| 7 | 68.1 | 21.9 | 10.0 |
| 8 | 70.0 | 20.0 | 10.0 |
| 9 | 54.25 | 38.0 | 7.75 |
| 10 | 70.0 | 10.0 | 20.0 |
| 12 | 72.25 | 15.1 | 12.1 |
| 13 | 73.5 | 16.5 | 10.0 |
| 14 | 73.0 | 12.0 | 15.0 |
| 15 | 67.5 | 15.5 | 17.0 |
| 16 | 64.95 | 19.3 | 15.75 |
| 17 | 60.0 | 30.0 | 10.0 |

Results. From the values of $\log \eta$ obtained at definite temps. between 750° and 1500° C, curves were drawn from which the viscosities at round temp. intervals were interpolated.

TABLE 17
VISCOSITIES OF GLASSES INVESTIGATED

Values at round temperature intervals. Interpolated from the $\log \eta$ curves (Fig. 8)

| Temp., deg. C | Glass number | | | | | | | | | |
|---------------------|--------------|-----------------------|-------------|-----------------------|-------------|-----------------------|-------------|-----------------------|-------------|-----------------------|
| | 1 | | 2 | | 3 | | 4 | | 5 | |
| | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ |
| 1500 | | | 2.330 | 0.21 ₄ | 1.580 | 0.038 | 0.91 | 0.0081 | 1.19 | 0.015 ₈ |
| 1475 | | | 2.404 | 0.25 ₄ | 1.660 | 0.046 | 1.000 | 0.010 | 1.27 | 0.018 ₆ |
| 1450 | | | 2.478 | 0.30 | 1.735 | 0.054 ₄ | 1.085 | 0.012 | 1.35 | 0.022 ₄ |
| 1425 | | | 2.560 | 0.36 | 1.810 | 0.064 ₆ | 1.170 | 0.015 | 1.43 | 0.027 |
| 1400 | | | 2.638 | 0.43 ₄ | 1.887 | 0.077 | 1.257 | 0.018 | 1.510 | 0.032 ₄ |
| 1375 | | | 2.730 | 0.54 | 1.960 | 0.091 | 1.348 | 0.022 | 1.600 | 0.040 |
| 1350 | | | 2.835 | 0.68 ₄ | 2.037 | 0.11 | 1.440 | 0.027 ₈ | 1.690 | 0.049 |
| 1325 | | | 2.945 | 0.88 | 2.117 | 0.13 | 1.535 | 0.034 | 1.795 | 0.062 ₄ |
| 1300 | | | 3.070 | 1.2 | 2.205 | 0.16 | 1.630 | 0.043 | 1.913 | 0.082 |
| 1275 | | | 3.209 | 1.6 | 2.300 | 0.20 | 1.735 | 0.054 | 2.055 | 0.11 ₄ |
| 1250 | | | 3.355 | 2.2 ₆ | 2.403 | 0.25 | 1.840 | 0.069 | 2.223 | 0.17 |
| 1225 | | | 3.515 | 3.3 | 2.507 | 0.32 | 1.945 | 0.088 | 2.415 | 0.26 |
| 1200 | 0.93 | 0.0085 | 3.690 | 4.9 | 2.620 | 0.42 | 2.050 | 0.11 | 2.630 | 0.43 |
| 1175 | 0.985 | 0.0097 | 3.880 | 7.6 | 2.735 | 0.54 | 2.160 | 0.14 ₈ | 2.880 | 0.76 |
| 1150 | 1.040 | 0.011 | 4.085 | 12 | 2.860 | 0.72 ₈ | 2.270 | 0.18 ₆ | 3.150 | 1.4 |
| 1125 | 1.100 | 0.012 ₆ | 4.290 | 19.5 | 2.980 | 0.95 ₆ | 2.385 | 0.24 | 3.450 | 2.8 |
| 1100 | 1.167 | 0.015 | 4.500 | 31.5 | 3.104 | 1.3 | 2.500 | 0.31 ₆ | 3.770 | 5.9 |
| 1075 | 1.250 | 0.018 | | | 3.235 | 1.7 | 2.627 | 0.42 ₄ | 4.115 | 13 |
| 1050 | 1.350 | 0.022 ₄ | | | 3.367 | 2.3 | 2.758 | 0.57 | 4.450 | 28 |
| 1025 | 1.477 | 0.030 | | | 3.500 | 3.1 ₆ | 2.895 | 0.78 ₈ | 4.800 | 63 |
| 1000 | 1.620 | 0.042 | 5.4 | 250 | 3.640 | 4.3 ₆ | 3.040 | 1.1 | 5.165 | 14 ₆ |
| 975 | 1.780 | 0.060 | | | 3.795 | 6.2 ₄ | 3.196 | 1.6 | 5.55 | |
| 950 | 1.950 | 0.089 | | | 3.950 | 8.9 | 3.350 | 2.2 | | |
| 925 | 2.130 | 0.13 ₈ | | | 4.120 | 13 | 3.515 | 3.3 | | |
| 900 | 2.320 | 0.21 | | | 4.300 | 20 | 3.683 | 4.8 | | |
| 875 | | | | | 4.500 | 31.6 | 3.865 | 7.3 | | |
| 850 | | | | | 4.700 | 50 | 4.055 | 11 | | |

TABLE NO. 17 (Continued)

| Temp., deg. C | Glass number | | | | | | | | | |
|---------------------|--------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|
| | 3 | | | | | 4 | | | | |
| | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ |
| 825 | 4.910 | 81 | | | 4.275 | 19 | | | | |
| 800 | 5.140 | 140 | | | 4.515 | 33 | | | | |
| 775 | 5.380 | 240 | | | | | | | | |
| 750 | 5.630 | 430 | | | | | | | | |

| Temp., deg. C | Glass number | | | | | | | | | |
|---------------------|--------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|
| | 6 | | 7 | | 8 | | 9 | | 10 | |
| | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ |
| 1500 | 0.93 | 0.0085 | 1.441 | 0.027 ₆ | 1.580 | 0.038 | | | 1.770 | 0.059 |
| 1475 | 1.030 | 0.011 | 1.527 | 0.034 | 1.660 | 0.046 | | | 1.865 | 0.073 |
| 1450 | 1.126 | 0.013 | 1.620 | 0.042 | 1.753 | 0.056 ₆ | | | 1.960 | 0.091 |
| 1425 | 1.224 | 0.017 | 1.710 | 0.051 | 1.847 | 0.070 | | | 2.007 | 0.100 |
| 1400 | 1.323 | 0.021 | 1.800 | 0.063 | 1.940 | 0.087 | 0.88 | 0.0076 | 2.160 | 0.14 ₅ |
| 1375 | 1.427 | 0.027 | 1.890 | 0.077 ₆ | 2.035 | 0.11 | 0.965 | 0.0092 | 2.220 | 0.16 ₆ |
| 1350 | 1.515 | 0.033 | 1.978 | 0.095 | 2.130 | 0.13 ₅ | 1.050 | 0.011 | 2.380 | 0.24 |
| 1325 | 1.612 | 0.041 | 2.065 | 0.11 ₅ | 2.230 | 0.17 | 1.140 | 0.014 | 2.502 | 0.32 |
| 1300 | 1.708 | 0.051 | 2.160 | 0.14 ₅ | 2.330 | 0.21 ₄ | 1.230 | 0.017 | 2.640 | 0.43 ₄ |
| 1275 | 1.814 | 0.065 | 2.258 | 0.18 | 2.437 | 0.27 | 1.330 | 0.021 ₄ | 2.810 | 0.64 ₄ |
| 1250 | 1.905 | 0.080 | 2.360 | 0.23 | 2.545 | 0.35 | 1.430 | 0.027 | 3.040 | 1.1 |
| 1225 | 2.015 | 0.10 | 2.470 | 0.29 ₅ | 2.660 | 0.46 | 1.540 | 0.034 ₆ | 3.375 | 2.4 |
| 1200 | 2.143 | 0.14 | 2.587 | 0.38 ₆ | 2.777 | 0.60 | 1.645 | 0.044 | 3.840 | 6.9 |
| 1175 | 2.315 | 0.21 | 2.715 | 0.52 | 2.900 | 0.79 ₄ | 1.757 | 0.057 | 4.315 | 21 |
| 1150 | 2.560 | 0.36 | 2.860 | 0.72 ₅ | 3.030 | 1.1 | 1.870 | 0.074 | 4.760 | 57.5 |
| 1125 | 3.000 | 1.0 | 3.000 | 1.0 | 3.165 | 1.4 ₆ | 1.995 | 0.099 | 5.240 | 174 |
| 1100 | 3.53 | 3.4 | 3.140 | 1.4 | 3.306 | 2.0 | 2.130 | 0.13 ₅ | 5.79 | 620 |
| 1075 | 3.98 | 9.5 ₅ | 3.290 | 1.9 ₆ | 3.455 | 2.8 ₆ | 2.395 | 0.25 | | |
| 1050 | 4.34 | 22 | 3.450 | 2.8 | 3.603 | 4.0 | 2.700 | 0.50 | | |
| 1025 | 4.65 | 45 | 3.603 | 4.0 | 3.765 | 5.8 | 3.050 | 1.1 | | |
| 1000 | 4.95 | 89 | 3.765 | 5.8 | 3.930 | 8.5 | 3.415 | 2.6 | | |
| 975 | 5.23 | 170 | 3.935 | 8.6 | 4.103 | 12.6 | 3.795 | 6.2 ₄ | | |
| 950 | 5.51 | 32 ₄ | 4.100 | 12.6 | 4.284 | 19 | 4.200 | 16 | | |
| 925 | | | 4.270 | 18.6 | 4.477 | 30 | 4.835 | 68.4 | | |
| 900 | | | 4.445 | 28 | 4.685 | 48.4 | (6.05) | 1100.0 | | |
| 875 | | | 4.622 | 42 | 4.910 | 81 | | | | |
| 850 | | | 4.800 | 63 | 5.132 | 13 ₆ | | | | |
| 825 | | | 5.000 | 100 | 5.370 | 23 ₄ | | | | |
| 800 | | | 5.185 | 150 | 5.630 | 430 | | | | |
| 775 | | | 5.390 | 24 ₅ | | | | | | |

| Temp., deg. C | Glass number | | | | | | | | | | | |
|---------------------|--------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|------------|-----------------------|
| | 12 | | | 13 | | | 14 | | | 15 | | |
| | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ | log η | $\eta \times 10^{-3}$ |
| 1500 | 1.627 | 0.042 ₄ | 1.680 | 0.048 | 2.43 | 0.27 | 1.57 | 0.037 | 1.41 | 0.026 | 1.08 | 0.012 |
| 1475 | 1.742 | 0.055 | 1.805 | 0.064 | 2.52 | 0.33 | 1.650 | 0.044 ₆ | 1.49 | 0.031 | 1.17 | 0.015 |
| 1450 | 1.856 | 0.072 | 1.930 | 0.085 | 2.62 | 0.42 | 1.735 | 0.054 | 1.57 | 0.037 | 1.26 | 0.018 |
| 1425 | 1.970 | 0.093 | 2.060 | 0.11 ₅ | 2.71 | 0.51 | 1.823 | 0.066 ₅ | 1.66 | 0.046 | 1.35 | 0.022 ₄ |
| 1400 | 2.090 | 0.12 | 2.180 | 0.15 | 2.805 | 0.64 | 1.910 | 0.081 | 1.750 | 0.056 | 1.445 | 0.028 |
| 1375 | 2.210 | 0.16 | 2.310 | 0.20 ₄ | 2.900 | 0.79 ₄ | 2.000 | 0.10 | 1.840 | 0.069 | 1.535 | 0.034 |
| 1350 | 2.330 | 0.21 ₄ | 2.440 | 0.27 ₅ | 3.000 | 1.0 | 2.098 | 0.12 ₆ | 1.930 | 0.085 | 1.625 | 0.042 |
| 1325 | 2.445 | 0.28 | 2.570 | 0.37 | 3.09 | 1.2 | 2.200 | 0.16 | 2.020 | 0.10 ₅ | 1.715 | 0.052 |
| 1300 | 2.560 | 0.36 | 2.700 | 0.50 | 3.190 | 1.5 ₅ | 2.320 | 0.21 | 2.120 | 0.13 | 1.805 | 0.064 |
| 1275 | 2.680 | 0.48 | 2.840 | 0.69 | 3.300 | 2.0 | 2.450 | 0.28 | 2.225 | 0.17 | 1.897 | 0.079 |
| 1250 | 2.794 | 0.62 | 2.980 | 0.95 ₅ | 3.420 | 2.6 | 2.590 | 0.39 | 2.331 | 0.21 ₄ | 1.994 | 0.098 ₆ |
| 1225 | 2.910 | 0.81 | 3.115 | 1.3 | 3.560 | 3.6 | 2.735 | 0.54 | 2.450 | 0.28 | 2.075 | 0.12 |
| 1200 | 3.030 | 1.1 | 3.260 | 1.8 | 3.710 | 5.1 | 2.890 | 0.77 ₆ | 2.580 | 0.38 | 2.180 | 0.15 |
| 1175 | 3.160 | 1.4 ₅ | 3.405 | 2.5 ₄ | 3.910 | 8.1 | 3.047 | 1.1 | 2.715 | 0.52 | 2.277 | 0.19 |
| 1150 | 3.293 | 1.9 ₆ | 3.550 | 3.5 ₆ | 4.140 | 14 | 3.210 | 1.6 | 2.860 | 0.72 ₄ | 2.375 | 0.24 |
| 1125 | 3.435 | 2.7 | 3.700 | 5.0 | 4.430 | 27 | 3.380 | 2.4 | 3.000 | 1.0 | 2.477 | 0.30 |

| Temp., deg. C | Glass number | | | | | | | | | | | |
|---------------------|--------------|-----------------------|-------------|-----------------------|-------------|-----------------------|-------------|-----------------------|-------------|-----------------------|-------------|-----------------------|
| | 12 | | 13 | | 14 | | 15 | | 16 | | 17 | |
| | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ | $\log \eta$ | $\eta \times 10^{-3}$ |
| 1100 | 3.590 | 3.9 | 3.850 | 7.1 | 4.8 | 63 | 3.555 | 3.6 | 3.150 | 1.4 | 2.580 | 0.38 |
| 1075 | 3.760 | 5.7 ₆ | 4.000 | 10 | | | 3.750 | 5.6 | 3.310 | 2.0 ₄ | | |
| 1050 | 3.942 | 8.7 ₆ | 4.147 | 14 | | | 3.940 | 8.7 | 3.480 | 3.0 | | |
| 1025 | 4.145 | 14 | 4.250 | 18 | | | 4.145 | 14 | 3.670 | 4.7 | | |
| 1000 | 4.365 | 23 | 4.460 | 29 | | | 4.370 | 23.4 | 3.880 | 7.6 | 3.02 | 1.0 ₈ |
| 975 | 4.630 | 42.6 | 4.615 | 41 | | | 4.605 | 40 | 4.105 | 13 | | |
| 950 | 4.900 | 79 | 4.770 | 59 | | | 4.875 | 75 | 4.360 | 23 | | |
| 925 | 5.180 | 150 | 4.927 | 84.5 | | | 5.170 | 150 | 4.630 | 42.6 | | |
| 900 | 5.460 | 290 | 5.090 | 120 | | | 5.500 | 31 ₆ | 4.920 | 83 | (3.5) | 3.1 ₆ |
| 875 | 5.760 | 57 ₆ | 5.250 | 180 | | | | | 5.250 | 180 | | |
| 850 | | | 5.410 | 260 | | | | | 5.625 | 420 | | |
| 825 | | | 5.575 | 37 ₆ | | | | | | | | |
| 800 | | | 5.73 | 540 | | | | | | | | |

Graphic representation of results. Isothermal space models were constructed, showing the variations in viscosity with compn. at temps. of 1500°, 1400°, 1300°, 1200°, 1100°, 1000° and 900°C. The contour lines connect the compns. which have the same value of $\log \eta$ at the given temp., as in Fig. 10. The contour lines were then projected on the triaxial compn. field, giving the Figs. 12-18. The term *isokom* is suggested for identical values of η , i. e., for the glasses having different compns. but the same viscosity at the same temp. *Interpolation from the triaxial diagrams.* The viscosities of a glass as *P* at any given temps. can be obtained by plotting the values of $\log \eta$ against the corresponding values of temp., detd. from the triaxial diagrams. From the curve the value of $\log \eta$ for the temp. in question is read and converted to the antilog, giving

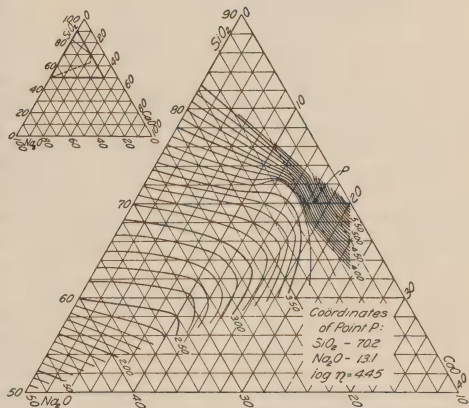


FIG. 14.—Log isokoms at 1100°C.

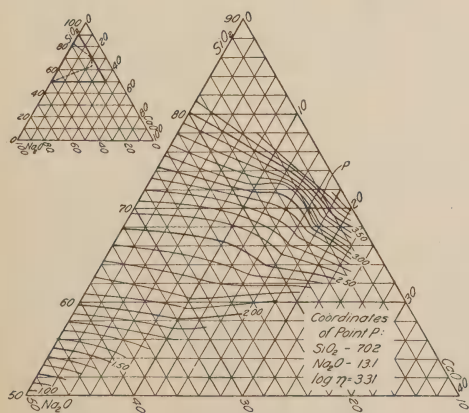


FIG. 15.—Log isokoms at 1200°C.

the viscosity in poises. *Accuracy and precision of results.* Above 1000 poises the results are probably accurate within 20% and below 1000 poises within 10%. The precision is probably 5% or better. *Influence of dissolved carbon dioxide.* The viscosities of glass No. 9 after being melted in a vacuum furnace until evolution of CO₂ had ceased, were compared with the results obtained on the glass treated in the ordinary manner. The changes in viscosity were within the exptl. error. *Influence of alumina.* 5% of Al₂O₃ was dissolved in glass No. 12, giving it a total content of 6% Al₂O₃. In general the addition of alumina caused an increase in viscosity, the max. increase

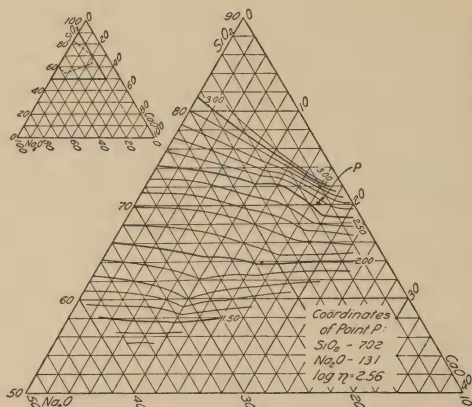


FIG. 16.—Log isokoms at 1300°C.

tained in a platinum wire resistance furnace. The telescope of a cathetometer was focussed on a point at the lower end of the spring and a reading taken. The molten glass was then raised until the surface just touched the lower edge of the cylinder. The cylinder was immediately pulled into the liquid by the capillary forces. At equilibrium another reading was taken. From these readings, the dimensions of the cylinder, the density of the liquid, and the calibration const. of the spring, the surface tension of the liquid was calcd. Assuming that the angle of contact between molten glass and platinum is zero, due to the wetting

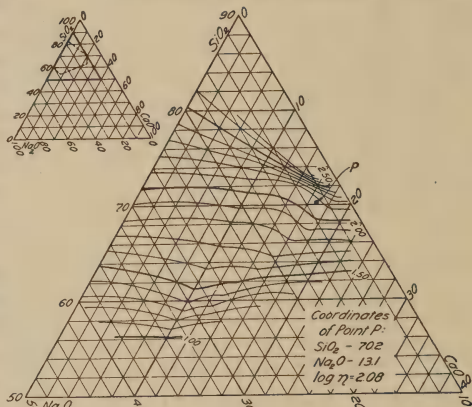


FIG. 17.—Log isokoms at 1400°C.

of the platinum by glass, equation (7) may be simplified to give equation

$$(9): \gamma = \left(\frac{kgE}{2L} + \frac{hdgw}{2} \right) \frac{1}{\cos \theta} \quad (7);$$

$$\gamma = \left(\frac{k}{2k'L'} + \frac{dw}{2} \right) Eg \quad (9),$$

where γ is surface tension, k the mass necessary to elongate the spring by a unit quantity, $k'L'$ the true circumference of the cylinder, L' being the measured (apparent) circumference and k' a const. for the metal detd. from equation (9) by calibrating the apparatus with liquids of known surface tension—benzene and water, d the density of the glass, w the thickness of the

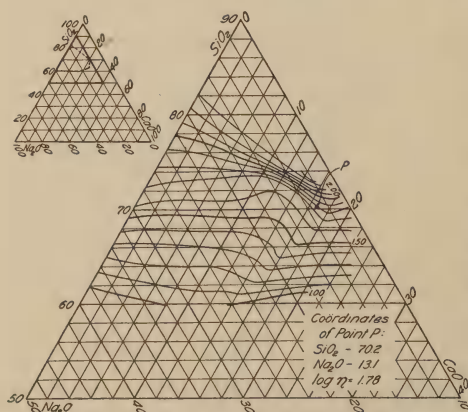


FIG. 18.—Log isokoms at 1500°C.

cylinder, E the elongation of the spring, h the depth of the cylinder in the glass, and g the acceleration due to gravity. In the present method of operating h is equal to E . Due to the expansion of the platinum at the high temps. a coeff. of linear thermal expansion of 0.00001 was allowed. *Density of glasses at high temperatures.* The data detd. by S. H. Li ("Densities of the Soda Lime Glasses at High Temperature," Bachelor's Thesis, Univ. of Ill., 1922) were used. A solid platinum sphere was substituted for the platinum cylinder, and submerged in the molten glass.

Surface tension of soda-lime-silica glasses. The results are given in Table 24, for surface tension measurements (dynes per cm.) made at two temps., 1206° and 1454°C. Solid models were made to correspond to the data, and *isoeptatic* lines (lines of equal surface tension) were drawn on the model. These lines were then projected on the compn. triaxials giving Figs. 24 and 25.

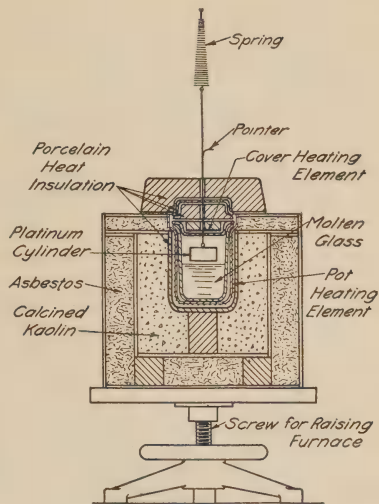


FIG. 22.—Furnace and apparatus for measuring the surface tension of glass at high temperatures.

TABLE 23

| DENSITY (IN AIR) OF GLASSES AT 1206°C AND 1454°C | | |
|--|-----------------|-----------------|
| Glass No. | Density, 1206°C | Density, 1454°C |
| 2 | 2.19 | 2.15 |
| 3 | 2.42 | 2.41 |
| 4 | 2.28 | 2.35 |
| 5 | 2.61 | 2.59 |
| 6 | 2.46 | 2.41 |
| 7 | 2.31 | 2.26 |
| 8 | 2.26 | 2.20 |
| 9 | 2.26 | 2.28 |
| 10 | 2.31 | 2.23 |
| 12 | 2.28 | 2.23 |
| 13 | 2.31 | 2.28 |
| 15 | 2.48 | 2.45 |
| 16 | 2.40 | 2.43 |

TABLE 24

SURFACE TENSION READINGS WITH SODA-LIME-SILICA GLASSES

| Glass No. | E | | Surface tension, dynes per cm. | | $\frac{\Delta\gamma}{\Delta t}$ |
|-----------|--------|--------|--------------------------------|--------|---------------------------------|
| | 1206°C | 1454°C | 1206°C | 1454°C | |
| 2 | ... | 2.438 | ... | 153.7 | .... |
| 3 | 2.526 | 2.296 | 164.0 | 148.8 | 0.061 |
| 4 | 2.442 | 2.358 | 156.1 | 153.6 | 0.010 |
| 5 | 2.472 | 2.404 | 164.1 | 158.7 | 0.022 |
| 6 | 2.450 | 2.422 | 159.6 | 128.0 | 0.013 |
| 7 | 2.339 | 2.285 | 150.0 | 145.9 | 0.0165 |
| 8 | 2.410 | 2.212 | 153.6 | 140.4 | 0.054 |

TABLE 24 (Continued)

| Glass No. | E | | Surface tension, dynes per cm. | | $-\frac{\Delta\gamma}{\Delta t}$ |
|-----------|--------|--------|--------------------------------|--------|----------------------------------|
| | 1206°C | 1454°C | 1206°C | 1454°C | |
| 9 | 2.596 | 2.411 | 165.4 | 153.7 | 0.047 |
| 10 | 2.516 | 2.452 | 164.0 | 156.4 | 0.031 |
| 12 | ... | 2.384 | ... | 151.6 | 0.030 |
| 13 | 2.552 | 2.464 | 166.9 | 159.4 | 0.030 |
| 15 | 2.406 | 2.246 | 158.7 | 145.4 | 0.0546 |
| 16 | 2.319 | 2.139 | 150.1 | 138.6 | 0.0465 |

Application of method when density of liquid is not known. After taking the reading A of the cylinder before immersion, and the reading B_1 on immersion in the glass due to surface tension, another reading B_2 is taken after the furnace has been raised or lowered a known amount. In the modified equation (13),

$$d = \frac{\frac{2\gamma}{g} - \frac{kE}{k'L'(1 + t \times 10^{-5})}}{wh(1 + t \times 10^{-5})},$$

for the reading B_1 , $E = h = A - B_1$, for the reading B_2 , $E = A - B_2$, and $h = A - B_2 \pm H$ (plus sign if furnace is raised, minus if it is lowered). Substituting these values, and obtaining an equation for each reading B_1 and B_2 , and equating them, d is eliminated, giving equation (16): $\gamma =$

$$\frac{\pm k(A - B_1)Hg}{2k'L'(1 + t \times 10^{-5})(B_1 - B_2 \pm H)}.$$

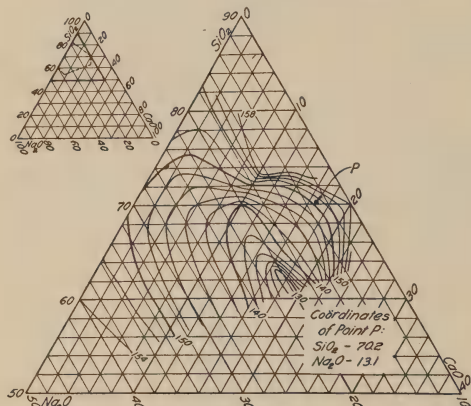


FIG. 24.—Isoeptatic lines at 1454°C.

The results by this method compare favorably with those obtained by the first method. *Temperature coefficient.* The temp. coeffs. are given in the last column of Table 24. They vary between 0.02 and 0.04% per degree C. Surface tension on glass No. 16 was measured at intermediate temps. with the following results: 1454° 137.2, 1397° 140.0, 1356° 143.7, 1314° 146.3, 1289° 148.2, 1248° 149.4, 1206° 150.1. By the use of the temp. coefficients the surface tension of a glass on the triaxial may be approx. computed for any temp. between 1206° and 1454°C.

L. N.

The use of alumina in glass.

R. R. SHIVELY. *The Ceramist*, 4,

82(1924).—A summary of modern views of the influence of this reagent is given as follows: (1) Reduces the soly. more than lime, (2) Reduces thermal expansion of glass more than lime or magnesia, (3) Alumina aids in preventing devitrification, (4) Reduces

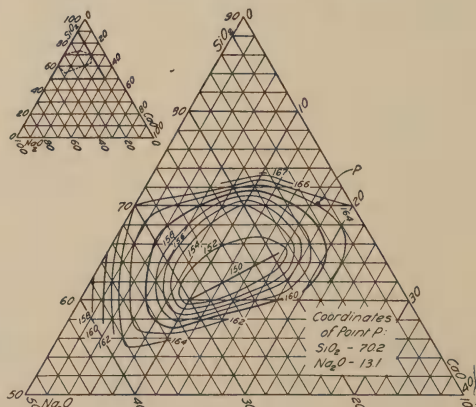


FIG. 25.—Isoeptatic lines at 1206°C.

annealing temps., (5) Alumina assists in reducing m. p. in some glasses, (6) Increases luster, (7) Reduces the tendency of soda-lime glasses to scum, (8) Successfully resists failure due to sudden changes in temp. (9) It is reported that it reduces the breaking of ware during finishing. In a number of glasses analyzed it has been found that less than 5% lime combined with 2% alumina, a normal silica content and as much as 20% soda gives a very insol. glass.

C. W. P.

The manufacture and uses of fused silica glassware. STAFF ARTICLE. *The Ceramist*, 4, 41(1924).—A briefly descriptive article of the history of the manuf. of wares of this type and description of the process used. Comparison of the properties of fused silica and hard porcelain is given as follows:

| | Fused silica | Hard porcelain |
|---|--|--|
| Specific gravity | 2.10 | 2.3-2.5 |
| Tensile strength | Over 700 kg. per sq. cm. | 300 kg. per sq. cm. |
| Resistance to compression | 19,800 kg. per sq. cm. | 4000 kg. per sq. cm. |
| Modulus of elasticity | 7200 kg. per sq. cm. | 8500 kg. per sq. cm. |
| Average specific heat | .2313 (100°-1600°) | .221 (20°-400°) |
| Coeff. of expansion | .00000059 | .00000380 |
| Heat conductivity | .0026 | Over .0025 |
| Melting point | 1700°-1800° | About 1670° |
| Softening point | About 1500° | About 1400° |
| Elec. resist. at 727°C | 400,000 ohms | 170,000 ohms |
| Resist. to penetration | 30,000 volts with a thickness of 1.2 mm. | 40,000 volts with a thickness of 2.5 mm. |
| Dielectric constant | 3.5-3.6 | 5.7 |
| Permanency as to weight | High | High |
| Chem. resist. to H ₂ SO ₄ | Absolute | Very high |
| Chem. resist. against NaOH | Attacked | Attacked slowly |
| Permeability to ultra violet light | Up to approx. 180 u.u. | .... |
| Hardness | 7 according to Mohr | 7 according to Mohr |

C. W. P.

Quartz glass manufacture. *Nature*, 114, 516(1924).—(*Physikalische Zeits.*, Aug. 1.) Gives a description of the Herberger method for producing quartz glass for therapeutic and other scien. purposes. This method has been in use for the last 11 years by the firm of Goertz. The finely divided quartz is melted in an elec. fur. in which a vacuum is maintained by continuous pumping until the melting process is complete. The vacuum is then replaced by a gas such as carbonic acid gas under a press. of 8 to 12 atmos., and after a considerable time the fused quartz is allowed to cool. The result is a block of quartz contg. only minute air bubbles in which the air press. is as nearly as possible that of the atmosphere and therefore produces no elastic stresses in the material. According to observations made by G. Joos and described in the same issue, quartz glass made in this way is as transparent in the ultra violet as rock crystal. O. P. R. O.

Equipment for glass pot factory. ANON. *Glass Worker*, 43 [48], 10(1924).—The Ohio Valley Clay Co. of Steubenville, O. installs new equipment. Crusher from the Champion Crusher Co., screens from the Tyler Screen Co., elevators and conveyors from Stephens-Adamson Co., Aurora, Ill. A Dressler tunnel kiln is used for firing and the fired blocks are trued on electrical grinding tables. R. J. M.

Modern methods of glassware decoration. L. KNY. *Glass Worker*, 43 [49], 11 (1924); from Pottery & Glass Trades' Benevolent Institute, England, Mar. 13, 1924.—

Methods of decoration are described including etching, gilding, enameling, glass cameo carving and cased glass. Too much detail to abstract. R. J. M.

Durability of glass and its importance to the pharmacist. W. E. S. TURNER. *Pharm. J.*, **112**, 264-6(1924).—In a series of 11 samples of soda-lime glass with increasing amts. of CaO, the decrease in soly. upon boiling for 6 hrs. with H₂O, or with 20.24% HCl, or for 3 hrs. with 2 N NaOH or 2 N Na₂CO₃ is shown in tables and by graph. The usefulness of the *narcotine-HCl* reagent (*C. A.*, **18**, 736; cf. Anneler, *C. A.*, **7**, 2451; **16**, 1294) in detg. the resistance of glass to boiling H₂O is pointed out. S. W. (*C. A.*)

Glass as a raw material in illuminating engineering. ZSCHIMMER. *Glastechn. Ber.*, **1**, 73-6(1923); *Chimie et industrie*, **11**, 930(1924).—An address on the properties and qualities required of glass used for illumination purposes. A. P.-C. (*C. A.*)

PATENTS

Glass. CHARLES A. KRAUS. U. S. 1,508,455, Sept. 16, 1924. A glass contg. lead oxide and having a coefficient of thermal expansion below about 4.0×10^{-6} .

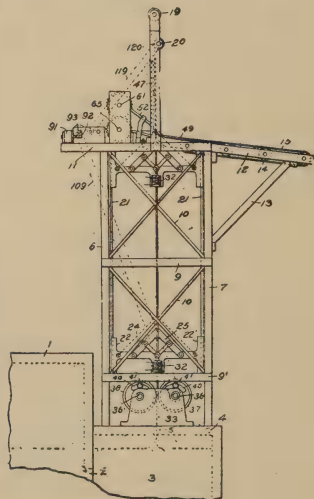
Glass feeder. CLAUDE W. PLEUKHARP and HARRY RAYNES. U. S. 1,507,852. Sept. 9, 1924. The combination with a glass feeding vessel having a discharge orifice in its bottom of an arcuate plate having a central handle member and pivotally mounted on the bottom of the vessel and having sliding contact therewith and a series of spigots, each of a different size carried by said plate and adapted to be moved into successive register with the discharge orifice whereby one spigot may be substituted for another, the plate meantime serving to cut off the flow of glass.



Method of making green scales. WALTER GLAESER. U. S. 1,508,448, Sept. 16, 1924. In a method of producing green scales, the steps which consist in treating calcium citrate with ferric sulphate soln. and then removing the ppt. formed, then adding an ammonium salt removing further ppt., evapg. the filtrate to a strength to produce green scales and brushing the same onto glass.

Apparatus for drawing sheet glass. THOMAS B. CAMPBELL, JR. U. S. 1,508,049, Sept. 9, 1924. A sheet-glass drawing app. comprising a framework, a plurality of vertically reciprocating drawing frames adapted to intermittently grip the sheet being drawn, means for moving the drawing frames upwardly at a uniform and constant speed, means for keeping at least one of said frames reciprocating upwardly at all times, and means for causing said frames to move downwardly at a greater speed than during their upward movement.

Glass-grinding machinery. EDWARD T. BROWN. U. S. 1,508,378, Sept. 9, 1924. In the art of surfacing glass, and wherein the glass sheet is moved in a definite horizontal path beneath a fixedly-positioned instrumentality; a carrier for the glass-sheet and tracks on and between which it moves; a frame supported



outside the tracks and extending over the carrier travel path; a surfacing unit mounted in the frame within spaced-apart upper and lower bearings, said unit including a surfacing element operating within the space below the lower bearing, and a shaft for rotating the surfacing element with the shaft mounted in the bearings; means for rotating the



shaft and including a motor supported on the frame and having operating connections with the shaft within the space between said bearings; and unit-supporting and surfacing element positioning means operative to produce controllable gravity-pressure of the surfacing element on the sheet, said latter means including a rotatable adjusting element concentric with the shaft and positioned between the motor-operating connections and the lower bearing.

Heavy Clay Products

Mechanical handling equipment in face brick manufacture. G. L. MONTGOMERY. *Chem. Met. Eng.*, **31**, 413-6(1924).—A description of the plant of the Bradford Brick and Tile Co. The shale, shot down with dynamite, is loaded into 5 yd. capacity cars by steam shovels. These cars are hauled to a hopper in the top of the crusher house and automatically dumped. An apron feeder delivers the shale to two single roll crushers in series, from which it is fed onto a belt conveyor, and carried to the top of the grinder house, where it is dumped into bins. From here the crushed mat. is fed by apron feeders to three dry pan grinders, discharged into bucket elevators, which raise the dust to the screening room, and dump it onto "Hummer" screens. The fines pass into a bin while oversize is returned to the grinders. A disk loader beneath the bin delivers the dust to a belt conveyor, which dumps into a bin in the brick making building. Dry press brick, stiff mud brick and flat tile are made, and the machines are fed by belt conveyors. The dry press brick are loaded by hand onto a tunnel kiln car, directly in front of the press. This car is moved by an elec. locomotive to the point where the pusher for the drier takes it. The stiff mud brick are delivered by the cutter to a belt conveyor, from which they are loaded onto tunnel kiln cars by hand. Imperfect brick are left on the belt and dumped onto a return conveyor which returns them to the pug mill. Tile from the tile mach. are piled on Louden overhead carriers. After air drying for 24 hrs., the loaded carriers are moved over above the cars of green stiff mud brick, where a small quantity of tile is loaded on top of each car of brick. The cars are then pushed through the drier and fired in tunnel kilns. The kiln cars are unloaded by hand into carriers on roller conveyors, the carriers are picked up by a monorail crane and unloaded by hand in the store room. M. E. M.

Brick from shale. *Coll. Guardian*, **128**, 768(1924).—The method of mfg. brick from spent shale is first to crush down the shale so that it will all pass, say, a $1/4$ -in. mesh. The crushed shale is then mixed with about 10% of lime. The 2 are mixed and moistened. They are put under heavy press. in presses designed specif. for this class of brickmaking. The brick, on coming from the press, are strong enough to permit of their being handled and stacked onto wagons. As the wagons are being filled they are placed in long brick tunnels which, when full, are closed up, and steam at atmospheric pressure is turned in. The brick are allowed to remain in the steaming tunnels for about 6 hrs. On withdrawal, they are fit for immediate use. These brick are being largely used in various bldg. schemes and are giving satisfaction. (E. R. Sutcliffe, *Manchester Guardian*.) O. P. R. O.

Makes concrete blocks from brick bats. ANON. *Brick & Clay Rec.*, **65** [5], 313 (1924).—A well-known manufacturer of face and paving brick in the central West found by expt. that concrete blocks made from crushed brick aggregate were economical to manuf. and salable. The bats are crushed in a jaw crusher, and screened, the tailings being returned to a pulverizer. Only 6 or 7% of the resulting aggregate is retained in a $3/8$ " screen and all passes $1/2$ ". One part cement and 7 parts aggregate are mixed for 5 mins. in a batch mixer on top of an automatic concrete block mach. The blocks are steam cured in tunnels at 100°F for 36 to 48 hrs. They are then sprinkled for 2 or 3 days in the storage yard and in 10 days are ready for the market. P. D. H.

\$2700 started this tile producer. ANON. *Brick & Clay Rec.*, **65** [5], 319(1924).—

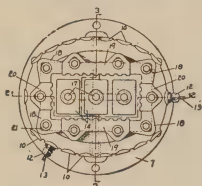
A novel feature of this plant is a monorail sliding door which has been developed for the fire box openings of the down-draft kilns. The door is composed of a fire-clay slab supported by metal hangers which in turn are attached to rollers that run on a curved rail above the fire boxes. The door is very easily operated and can be kept open any desired distance.

P. D. H.

BOOK

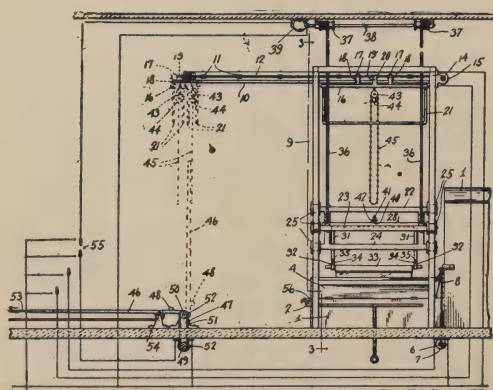
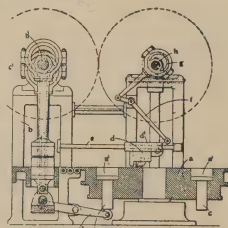
Adaptability of Tile to Hospital Requirements. CARL H. GEISTER (Industrial Fellow, Mellon Institute). Requisite properties of floor tile for hospital use are: resist. to abrasion, to absorption, to staining, to indenture, to heat and to chemicals, as well as a high coeff. of frictional resist. Of special note was the abrasion test. A leather faced wheel revolving against the tile duplicating as near as possible the wear of walking. Other tests were run in the usual manner. Some of the mat. tested were vitreous, semi-vitreous, glazed and rough paving tile, rubbers, linoleums, corks, magnesite compns., asphaltic compns. and marble aggregates. Of these mats., vitreous tile are the only ones not showing some absorption, ranking at the top in the abrasion test, the only group to get an "A" rating in both resistance to chem. and for non-staining qualities; also perfect in ht. resist. Vitreous tile showed no indentation when subjected to press. on a small area, yet show a high frictional resistance against slippage. From all tests conducted, vitreous tile lead in desirable qualities for hospital use. I. A. K.

PATENTS



Clay-forming die. DAVIS BROWN. U. S. 1,508,773, Sept. 16, 1924. In a clay forming die, a former, a finisher formed of corner and side sections, and means for adjustably securing the sections relative to the former and to each other.

Brickmaking and like press. THOMAS STANLEY. U. S. 1,510,349, Sept. 30, 1924. In a brickmaking press having a rotary mold table, a pusher horizontally reciprocated above the said table for transferring the blocks of molded material from the said table, said pusher comprising an oil receptacle, a plurality of openings through the bottom of the said receptacle, wicks inserted into said openings and means for supporting the pusher above the table so that the wicks are maintained in contact therewith.



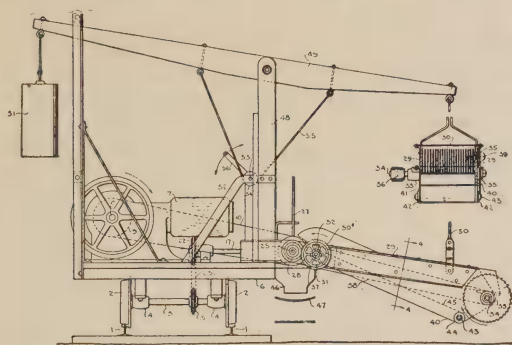
Glass-drawing apparatus.

DAVID L. SWINDELL. U. S. 1,509,183, Sept. 23, 1924. An app. of the class described comprising a straight bait bar, a vertically movable carriage, a supporting frame for the bait bar removably supported in the carriage a horizontally movable carriage, means thereon for automatically engaging the supporting frame when the vertically movable carriage brings said frame adjacent the horizontally movable carriage and means for moving said carriages.

Process for the manufacture of hollow brick closed on all sides.

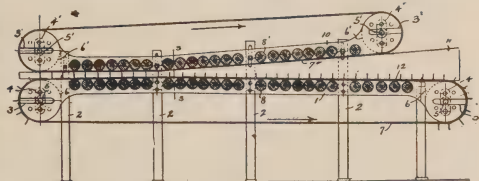
HANS TREITEL. U. S. 1,507,219, Sept. 2, 1924. A process for the manuf. of hollow brick closed on all sides consisting in a hollow brick being first pressed with an open end

and burrs of suitable thickness on two opposite walls and then pressing the burrs toward one another thereby forming a closed end having the desired cross-sectional dimensions. A device for the manuf. of hollow brick closed on all sides consisting in combination of a mold, lateral spaces thereon, said mold and spaces being adapted to be filled with plastic mat., a press ram or plunger adapted to press the hollow brick within said mold and spaces with an open end and thickened walls and press-members adapted to press the projecting thickened parts of the walls toward one another after the plunger is withdrawn, for the purpose of closing the open end of the brick.



plates carried by the boom, an endless belt moving between the side plates, said belt and plates forming a conveyor disposed to receive from said saws.

Brick-molding machine. JAMES T. POKORNY. U. S. 1,509,174, Sept. 23, 1924. In a molding mach., an endless belt, rollers over which the same operates, a series of molds carried by said belt, said rollers having peripheral ribs and grooves, the ribs of each roller fitting into the grooves of adjacent rollers. In a molding mach., an endless belt, rollers over which the same operates and a series of molds carried by said belt and formed of slightly flexible mat.



Refractories

Novel experiments in casting huge glass pots prove successful. ANON. *Ceram. Indus.*, 3 [3], 186(1924).—The U. S. Bur. of Stand. recently completed the drying of three exptl. pots having outside dimensions of 3 ft. 6 in. in height, 4 ft. 9 in. in diam. and a max. wall thickness of 5 in. 10 T. of plaster were used in making the mold. The equipment available necessitated mixing and pouring 8 batches of 300 lbs. of plaster each in the casting of a single section of the mold. Since the various sections had to be turned to the proper shape it was necessary for the set of the batches of plaster slip to be retarded progressively by the addn. of decreasing amts. of an organic retarder. The mold was cast and turned to shape on a surfacing wheel which functioned as a turning wheel. 1½ T. of slip were required to cast one pot and no particular difficulty was experienced in this phase of the work. A satisfactory body compn. is as follows:

| Body | % | Grog | % |
|-------------------|------|----------------------|----|
| Feldspar..... | 4.0 | Tenn. ball..... | 50 |
| Tenn. ball 5..... | 16.0 | Calcined to cone 10. | |
| Ky. ball 4..... | 9.0 | N. C. kaolin..... | 50 |
| N. C. kaolin..... | 12.0 | Calcined to cone 10. | |
| Del. kaolin..... | 4.5 | Grog Sizing: | |
| Ga. kaolin..... | 4.5 | 10-20-mesh..... | 20 |
| Flint..... | ... | 20-40-mesh..... | 50 |
| Grog..... | 50.0 | Through 40-mesh..... | 30 |

P. D. H.

Saving the surface of refractories by using a refractory coating. H. M. CHRISTMAN. *The Ceramist*, **4**, 107(1924).—A refrac. coating is not identical with refrac. cement. It is proposed to apply a superficial coating which will reduce the erosion and corrosion of refrac. Neither compn. nor data are given. C. W. P.

Some aspects of the industrial application of refractories. M. C. BOOZE. *The Ceramist*, 243(1923-4).—A résumé of the charac. and uses of the principal types of refrac. C. W. P.

The true specific gravity and after-expansion of lime-bonded silica brick. W. J. REES. *Jour. Soc. Chem. Ind.*, **43**, 986(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) Data are given in a graph and table for 40 brick from Great Britain and France. There is a close relation for brick contg. 1-3% lime, between powder density and the extent of quartz conversion. There is a close reln. for brick of fine and medium texture, but not for brick contg. fragments of $\frac{1}{4}$ in. or more in diam. between powder density and after-expansion as detd. by the standard after-expansion test. The powder density may, therefore, be used as an indication of the permanent vol. change which is likely to occur during use. The grading of raw mat. has greater influence on the rate of quartz conversion than variation in the source or type of the raw mat. itself. H. H. S.

The storage of silica refractories. W. J. REES. *Jour. Soc. Chem. Ind.*, **43**, 986(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) Silica brick which had been kept in the open for 6 mos. spalled badly in use, while new brick of the same make, texture, and sp. gr. were satisfactory. The good brick had a cold crushing strength of 3000 lb. per sq. in. while the stored brick had a strength of only 2200 lb. per sq. in. It is found that loss in strength by exposure is in part due to a slight loosening of the bond by hydration and soln. in water, as well as to the phys. effect of frequent wetting and drying. These tests showed little or no distinction between coarse and fine textured brick, but in both cases the brick fired at higher temps. were more resist. to action by water. H. H. S.

The influence of exposure on the chemical and physical properties of certain fire clays. W. HUGILL AND W. J. REES. *Jour. Soc. Chem. Ind.*, **43**, 985(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) Samples of 3 clays, 2 of them sandy and micaceous, the other fine-grained and more aluminous, were spread evenly over the bottoms of wooden boxes and exposed to the weather for 12 mos. Small brick were made from the exposed and unexposed samples. Exposure improved the working properties of the siliceous clays, but not materially the aluminous clay, though some impurities were removed. Bacteria seem to promote the decompn. of sulphides in clays, and possibly such decompn. may be accelerated by inoculations. H. H. S.

Some properties of clay-sillimanite mixtures. H. S. HOULDSWORTH. *Jour. Soc. Chem. Ind.*, **43**, 985(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) The commercial sillimanite used contd. 32.9% silica, 64% Al_2O_3 , with Fe_2O_3 and TiO_2 . The grading ranged from 11.8% of mat. between 5-mesh and 10-mesh through inter-

mediate grades to 18% of mat. through 200-mesh sieve. Results are summarized thus: Addition of sillimanite to clay decreases drying and burning shrinkages, increases porosity, and when 50% or more is present, increases refractoriness appreciably. A mixt. of 95% sillimanite with 5% ball clay has a regular coeff. expansion from 15° to 1000°. The rapid expansions of fire clays between 100 and 200°C, and 500 and 600°C, are reduced by the addn. of sillimanite. Chemical attack by soda-lime glasses and basic slag is less on mixt. contg. more than 50% sillimanite than on fire clay or mixt. with less sillimanite than 50%. Sillimanite bonded with 10 g. ball clay is markedly resistant to chem. attack.

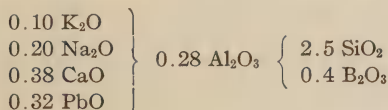
H. H. S.

Whitewares

The effect of the fineness of grain of flint and feldspar. G. H. BROWN. *The Ceramist*, 4, 29(1924).—Investigation was made on the influence of fine grinding of flint and feldspar upon a body of the following compn.: Fla. kaolin, 35%; feldspar, 35%; flint, 30%. The bodies were fired to cone 10 and porosity detd. Also the comparative effects of ball-mill grinding versus blunging bodies of the same compn. which were subsequently fired at cone 10. Results obtained were as follows: The body ground in a ball mill had a porosity of 4.96%, while the same body blunged for a similar period of time had a porosity of 9%. Results are summarized as follows: (1) The fineness of grain of commercial flints, prepd. under the same condition, is dependent somewhat upon the nature of the raw mat. from which they are produced. (2) Increased vitrification of a vitreous body may be secured by the use of more finely ground flint. (3) Increased vitrification of a vitreous body may be secured by the use of more finely ground feldspar. (4) The use of finely ground flint and feldspar in a body is conducive to some of the increase in vitrification secured by wet-grinding the flint and feldspar content of bodies in ball mills. (5) The substitution of a finely ground flint for a coarser product permits the use of a higher total flint content in a body. (6) Difficulties from cracking or "dunting" of vitreous bodies may be lessened by the use of a more finely ground flint or of a small propn. of extremely finely ground flint.

C. W. P.

The china ware and porcelain industries in Germany. F. J. M. KOENIG. *The Ceramist*, 269(1923-4).—Historical and statistical, with brief reference to typical compn. of hard and soft porcelain. The compn. of the so-called "light ware" which is still in use is approx. as follows: Refractory clay 25%, kaolin of Halle 30%, quartz or flint 35%, calcium carbonate 10%. The bisque is fired to about cone 3, and a glaze of the character as noted below is used, this melting occurring at cone 07:



Mfg. of semi-vitreous, table, toilet and sanitary ware is growing extensively. This being produced with a hard (?) glaze, fired from cone 04 to cone 2. The indus. is centered on the Rhine River. Its importance is small as compared with the porcelain indus. Continuous decorating kilns are used in about 50% of the potteries.

C. W. P.

BOOK

Lenox China. The Story of Walter Scott Lenox. GEORGE SANFORD HOLMES. This booklet gives in an interesting manner the life story of Walter Scott Lenox, and the history and development of the Lenox Pottery. Their process of making china is described in a non-technical manner. The booklet is well illustrated.

H. G. F.

Chemical stoneware. F. A. WHITAKER. *The Ceramist*, 4, 70(1924).—The body is a selected blend of plastic close firing stoneware clay to which a small amt. of feldspar and grit are added. The clays are previously washed, blunged and filter-pressed at a pressure of 250 lbs. per sq. in. Non-plastic mats. are added and the mixt. is passed through horizontal pug mill. The prepd. clay is aged in cellars. Circular pieces up to 7 ft. in diam. are jiggered in plaster molds. Piping is manufd. by extruding plastic clay through bronze die. The assembling of parts for complicated pieces requires a remarkable nicety of judgment in order to insure the avoidance of strains in drying and firing. The drying of simple pieces is done over steam coils or in chambers heated with waste heat from kilns. Larger and more complicated pieces are put through special drying chambers where heat and humidity are carefully controlled. Ware is fired in a rectangular down-draft open-fire kiln of special design. These measure 45 x 14 ft. inside and are furnished with 6 horizontal grate furnaces on each side. Gas coal is used as fuel. Time of burn av. about 86 hours. Pieces of all sizes and thickness from $\frac{1}{8}$ " to 6" are fired together in the same kiln. The ware is salted to develop a glaze. Interior surface may be coated with slip or loam glaze. The fitting and assembling of complicated pieces such as exhaust fans, centrifugal pumps, etc., necessitates accurate machining of the individual units after firing. This is done by special designed grinding tools. The total shrinkage of the ware during the process of manuf. is in some cases as high as 2" to the ft. All finished ware is subjected to finer inspection and test.

C. W. P.

Conditions in Saxon porcelain industry. A report of the Vice-Consul, C. T. STEGER, furnished by the Bureau of Foreign and Domestic Commerce. *The Ceramist*, 275 (1923-4).—General unfavorable situation in Saxony due to the decline of the value of the mark. The domestic demand is only for cheaper grades. Coarser products are increasing rapidly.

C. W. P.

Equipment and Apparatus

The use of auxiliary or portable fans for watersmoking. ANON. *Brick & Clay Rec.*, 65 [5], 327(1924).—Portable fans are being used to great advantage to hasten watersmoking and cooling of kilns. An illustration shows a fan being used in a slightly different manner, in that it is connected to a kiln stack by a sewer pipe connection set in the stack wall at an angle of about 45°. The firing time has been reduced from 8½ to 5 days.

P. D. H.

Facts on the problem of electrification. JAMES R. DOWNS. *Brick & Clay Rec.*, 65 [5], 323(1924).—The greatest hindrance to a rapid change from present methods to elec. drive is apparently the lack of accurate information on the power requirements of the different machines. A 10 ft. dry pan in a given plant requires 32 h. p. whereas the same sized pan in another plant grinding the same class of mat. requires from 75 to 100 h. p. depending upon the variation in the amt. and condition of the mat. in the pans; d. c. motors should not be installed in clay plants. While the a. c. motor is the more desirable, the standard general purpose squirrel-cage type is not as satisfactory as that known as the high torque motor. Bearings should be made dust-proof and motor driving pans, pug mills and brick machines should be of the three bearing type, that is, with outboard bearing and sub-base, to provide for heavy overloads. Individual motor drive is more satisfactory than group motor drive, as friction losses in the latter average about 35% and the former greatly facilitates repairs. Speed regulation is very important to secure uniform production. The cost of power varies from \$1.50 per M brick in the ganister district to \$.94 per M on a plant using hard shale making face brick in the Pittsburgh district. A list of the equipment used in this plant is

given including the various sized motors. A table also gives a complete chart of production, power consumption and costs over a 12-mo. period. P. D. H.

Removing ashes from radiated heat drier. HAROLD COPPING. *Brick & Clay Rec.*, **65** [1], 42(1924).—The device described is C.'s own idea. A very complete sketch accompanies the article. The equipment consists of a light overhead track rail extending the full length of the fireman's pit and suspended from the timbers or I-beams spanning the pit and upon which the drier tracks rest, a trolley and a specially constructed bottom dumping bucket. Above the pit and over the "cooling tracks" is a short length of track (about 20 ft.) hung at right angles to the pit and upon which a "hay carrier" operates. A small hand windlass attached to a post against the wall in the pit completes the outfit. The ash bucket has a capacity of about 20 cu. ft. and the bail is of such length as to place the bucket at a convenient shovelling height thus eliminating the necessity for a chain hoist. The bucket upon being filled is moved along the trolley to the point beneath the "hay carrier" track, where the cable is hooked onto the bail and by means of the windlass, the bucket is elevated and run out over a wagon, thus disposing of the ashes with one shovelling. P. D. H.

A few hints on clay plant hauling equipment. B. F. TOWNSLEY. *Brick & Clay Rec.*, **65** [1], 30(1924).—The particular type of mechanical haulage for a given plant depends on local conditions. Rope haulage should be employed in plants where the pit is located near by and the grade is above $2\frac{1}{2}\%$. If less than $2\frac{1}{2}\%$ other methods may be resorted to with a possible saving. A 1% grade takes almost double the energy that is necessary to move a load on a level track. In general practice, the haulage capacity of a locomotive is 13 T. per ton of locomotive weight, on the level, while with a 1% grade this is reduced to 8 T. and with a 5% grade to 3 T. The gasoline or elec. type of locomotive is generally preferred to steam. The advantages of the former are its low first cost, which is about \$750 per T., its simplicity of opern. and normal fuel consumption cost of about \$1.00 per T. weight per day. This type would accordingly be desirable in plants where requirements are for a less-than-three-ton locomotive. Elec. locomotives propelled by storage batteries offer a reliable, flexible and economical source of power. The first cost per T. wt. is about \$1400 and the cost to operate is about 10c per T. per day, and often less as the batteries are charged at night during the off-peak load of the plant. The proper size and type of car is another important factor. Standard practice dictates the use of the V-bottom, steel, side dump cars, where, in many instances, more efficient types could be used. Storage battery trucks are now being used for coal distribution, ash removal and green and fired ware transportation. Portable platforms facilitate the movement of ware. A truck of this type with one man can equal the capacity of from 5 to 10 men with wheelbarrows. P. D. H.

Development in dry pan construction. P. B. REED. *Brick & Clay Rec.*, **65** [5], 322(1924).—The rate of output of a dry pan depends much more upon the design and location of the mullers than upon the screen plate area. An older type of 9 ft. pan had 12 in. by 54 in. mullers, each having a wt. of 7429 lbs. The width of the screen plates was 18 in. and the grinding area in one revolution was 3419 sq. in. The diameter of the newer type of pan was reduced from 9 ft. to 8 ft. 6 in. by taking 3 in. off of the outside of the screen plates. The mullers were moved out 3 in. thus taking 2 in. off the inside of the screen plates. The dimensions of the mullers were $14\frac{1}{2}$ in. by 55 in. each having a wt. of 9301 lbs. The width of the screen plates was 12 in. and the grinding area in one revolution was 5938 sq. in. It was also found that wider slots in the screen plates produced more fines. The $\frac{1}{16}$ in. perforations were replaced with openings from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. and even larger, the limit being when too great a load is placed on the elevator and screen due to too large a percentage of tailings being returned to the

pan. By selecting the correct screen openings the new 8 ft. 6 in. pan will grind from 40 to 50 T. of 12- to 14-mesh hard fire clay dust per hr. P. D. H.

Things to remember when you buy belts. E. H. COLE. *Brick & Clay Rec.*, **65** [5], 326(1924).—Care should be taken in choosing the proper type of belt for the purpose intended. The size is also very important. When changing pulleys, the width should always be increased where possible, as this increases the area of belt contact with the pulley without increased thickness of belt. The pulleys should be kept as large in diameter as possible as it is most destructive to a belt to run over small pulleys. A new belt should be run slowly until it has adjusted itself to the stresses. Belts should be kept pliable by the use of a good belt dressing. Rosin is very undesirable. In joining a belt, laboratory tests have shown that a fastener which is designed to secure a firm hold on the threads of the belt is more satisfactory than rawhide lacing.

P. D. H.

The formation of kaolin at moderate depths. A. L. PARSONS. *Am. Mineral.*, **8**, 157-62(1923).—The feldspars and feldspathoids are the principal minerals from which kaolin may be formed. Carbonic acid is regarded responsible for most of the kaolinization of surface deposits. In a kaolinized dike at the Helen Fe mine (Ont.) CO₂ was liberated by the oxidation of a large body of siderite, the Fe forming goethite. The source of CO₂ in the kaolin deposits at Huberdeau, Que., was probably a cryst. limestone sepd. from the kaolinized granite and gneiss by a shattered quartzite.

E. F. H. (C. A.)

Drying. Industrial drying. The apparatus and how it works. LUCIEN BUCK. *Chem. Met. Eng.*, **29**, 626-31(1923).—The general principles of drying with air are set forth. There is a limit to the speed at which any material can be dried. If this limiting speed is exceeded, injury such as checking, warping, cracking, etc., usually results. Suggestions are made to designers of driers. Heat insulation is discussed. Driers are classified and as an example data are given and calcs. made for a drier for coco fiber mats.

E. R. G. A. (C. A.)

Self-cleaning continuous filter. ANON. *Chem. Met. Eng.*, **29**, 1193-4(1923).—1 illus. The ideal condition for filtration would be: (1) filtering performed by the solid matter in the liquid filtered; (2) the layer of this solid matter must be constantly removed without exposing the bare surface of the screen or filtering device; (3) the solid material should leave the filter with but a small % of moisture—dry if possible. The upper part of the filter consists of a cylinder ending in a short cone resting on bars placed radially inside of a shell, which rests on a saddle, permitting the escape of the filtrate into a surrounding basin. The saddle supports the bars and its central hole corresponds with a hole in the center of the basin, and is closed by a conical plug operated by hydraulic pressure. The displacement center is continued upward into the mixer in which a reciprocating plunger passes up and down into the upper cylinder to the beginning of the short cone. The functioning is explained. The design allows employment of any pressure that the shell will stand, the bars cannot become distorted, and there is complete absence of screens, cloth, and moving parts. W. H. B. (C. A.)

Fine screening equipment—its selection and operation. F. S. CURTIS. *Chem. Met. Eng.*, **29**, 759(1923).—Screening equipment must be adjustable. Specifications stated in fractions of an inch instead of in "mesh" become more definite and dependable. The use of a screen in closed circuit with grinding equipment increases the output without increasing the power requirement.

W. H. B. (C. A.)

Equipment for difficult screening. L. H. STURTEVENT. *Chem. Met. Eng.*, **29**, 1063(1923).—A description of the vibrating screen is given, pointing out its applications and advantages.

L. A. P. (C. A.)

Fuel oil viscometers. W. H. HERSCHEL. *Chem. Met. Eng.*, **26**, 1175(1922).—

After making the Couette correction ($0.311 \times \text{diam.}$) and the kinetic energy correction coeff. (1.128) the equation for the normal Saybolt Furol viscometer is *kinematic viscosity* = $0.0220t - (2.03/t)$. The corresponding equation for the Redwood Admiralty viscometer is *kinematic viscosity* = $0.0239t - (0.403/t)$. By using the equation for the Saybolt Universal viscometer, *kinematic viscosity* = $0.00220t - (1.80/t)$. With the above, H. calcs. tables for conversion of time Saybolt Furol to Universal and Redwood Admiralty.

E. C. B. (C. A.)

A simple thermoregulator for use with gas burners. FR. VIKTORIN. *Mikrokosmos*, 17, 138-9(1924).—A simple and inexpensive thermoregulator for the control of thermostat or incubator temps. is made in a test-tube. A cork contg. a 3 mm. internal diam. glass tube extending 4 cm. upward from the cork is fastened inside the test-tube about 5 cm. from the bottom. Hg fills the bottom of the test-tube and rises to the middle of the 3 mm. glass tube. The inlet tube leading from the illuminating gas supply passes through a cork in the top of the test-tube. The inner end is drawn to a long capillary and is cut off at an acute angle. The opening thus formed is adjusted at the proper height inside the 3 mm. tube so that expansion or contraction of the Hg automatically acts to diminish or increase the size of the opening. The illuminating gas is conducted from the thermoregulator to the burner by means of an exit tube through the upper cork. The test-tube regulator is installed in the thermostat or incubator. Minute details of construction are given.

R. L. D. (C. A.)

Kilns, Furnaces, Fuels and Combustion

Rectangular kiln bracing. WM. BURGESS. *The Clay Worker*, 81 [7], 669(1924).—One foot rise to each four ft. of width gives the longest life to kiln crowns. The crown should be built in sections to facilitate repairs. Kiln crowns have lasted 12 to 14 yrs. without renewing any part. One section 35 ft. in length lasted 16 yrs. without repairs. There should be as few flues as possible in the main walls. Half circle arches on rectangular kilns are not satisfactory as they are sure to bulge on the quarters or one side will rise and let the other side flatten. The best crown is made of wedge brick to properly fit the circle. As this would require special brick, wedge brick alternating with standards are satisfactory. Crowns should not be built with all standard brick with heavy mortar to keep the bed joint radial. A single 10-in. I-beam has been found stronger and cheaper than the old type of rod-braced double rail brick stay. The tie rods should be secured with forged loops over the I-beams. Each tie rod across the kiln should be provided with a turnbuckle and 2 or more should be used in the rods running lengthwise. Two runs of 60-lb. railroad iron should be placed around each kiln, one a little above the fur. arch and the other directly behind the skewback on the sides of the kiln. They should be fishplated together and placed close to the buck stay, on the ends of the kiln on the same level as the sides, one coming about half way down on each side of the wicket opening and the other one just over the top of the wicket arch. Expansion joints should be provided between the floor brick and the kiln wall. The lining should be thoroughly bonded to the main wall. The backing-up brick should not be loosely laid. Brick chips when used to loosely fill the voids will wedge down into the crevices and cause "crowding" as the wall contracts and expands.

P. D. H.

A comparison of gas- and coke-fired drying stoves. T. W. BARLEY. *Jour. Soc. Chem. Ind.*, 43, 985(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) City gas was used for drying large molds in steel works until post-war conditions made it too expensive. It was substituted by the Hüttenes coke-fired, air-blown fur., which with minor modifications has been found very satisfactory. The hot gases are met by a pre-ltd. jet of compressed air at 80 lb. per sq. in. press. the products of combustion

being thus projected into the drying chamber at a high velocity. All molds are thoroughly dried at the end of 15 hrs. no mold being found burned or imperfectly dried. The av. working temp. for mold drying is 225°C, for large cores 200°C, and for small cores 180°C.

H. H. S.

American furnaces for the treatment of iron and steel. BRUNO SCHAPIRA. *Feuerungstechnik*, 12 [21, 22, 23], 174, 184, 189(1924).—Describes in detail the function and different types of such furnaces and discusses the importance of the correct selection of refrac. for lining same. For the crown of the Martin fur. acid (silica) brick are used and for the hearth either an acid or a basic (magnesite) brick depending upon the conditions. The author refers to the research work being undertaken at this time by the Refractory Mfrs.' Assoc., etc., to bring about the following improvement in their product. (1) The manuf. of a more even product by keeping close check on raw mat., substituting dry grinding and screening for wet, close control of water content, (2) raising m. p. by adding new mat. with a m. p. 100° to 160°C higher than the best refrac. used to date, (3) increased resist. to temp. variations through larger use of calcined clays, control of grinding, improved methods of molding and use of better quality clays, (4) min. change in volume through use of brick fired at high temp. in elec. fur. and by using special raw mat., (5) resistance to action of slags. Several newer raw mat. of high refractoriness are mentioned, (a) Missouri diaspor which melts at cone 40 and is dense and slag resisting, (b) Calif. periclase, a cryst. oxide of magnesium, (c) spinel, (d) sillimanite, (e) fused silica.

F. A. W.

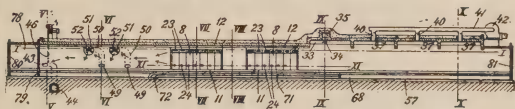
Operation of the Shaw gas kiln. LEROY H. MINTON. *The Ceramist*, 4, 15(1924).—A compartment kiln for finer grades of ware. Twenty-five are operg. and being built in England, 2 or 3 in France, and 2 are in use and 1 being built in the U. S. The kiln is used for all types of ware, excepting those requiring salt glazing. The kiln normally consists of 16 chambers, usually placed in 2 rows of 8 each with passageways between, the whole occupying an area of 100 ft. x 61 ft. The compartments have a setting space of 7 ft. x 23 ft. x 8 ft. The kiln is fired from gas produced from coal. A saving of 50–80% fuel over that required in periodic kilns is claimed. Fuel consumption of kilns now fired in England is given as follows: fire brick to cone 10 = 350 lbs. of coal per 1000 brick; glazed brick to cone 10 = 675 lbs. of coal per 1000 brick; architectural terra cotta to cone 6–7 = 19 tons of coal for 17 tons terra cotta per week. Comparison of fuel consumption of the Shaw kiln with periodical muffle kilns: for the muffle kilns the av. coal per kiln fired was 23.26 T. For the gas kiln the av. was 3.36 T. This is equiv. to 6.72 T. for a muffle kiln on the basis of output. On a direct comparison this shows the saving to be 72% of the coal required for periodic kilns. It is possible to fire different kinds of ware maturing at different temps. in different chambers. It is also possible to regulate the atmos. of the firing chamber so as to fire glazed ware without the use of muffle or saggars. The following results have been attained in this country: Vitreous sanitary ware, glost firing, 2.6 T. per coal per chamber containing 240 closet bowls or 300 tanks. Fire clay sanitary ware required 3.36 T. of coal per chamber containing 10 T. of ware and 7½ T. of fixtures fired to temp. of cone 9 down. Advantages claimed for the kiln are: (1) Saving of 50–80% fuel over periodic kiln. (2) Lower operg. cost. No coal or ashes to be carted in and out, or to block the kiln room. (3) Ease of operation. Perfect control at all times. One man can handle gas producer and kiln. (4) Lower labor costs. A kiln occupying 100 ft. x 61 ft. has a capacity equal to periodical kilns occupying 350 ft. x 40 ft. All labor of conveying ware is greatly reduced. No night loading is required as for tunnel kilns. (5) Compactness. Comparison with the Shaw kiln 100 ft. x 61 ft. with a tunnel kiln 350 ft. to 450 ft. long makes it evident to any engineer which is better adapted to fit in with modern factory design. This is a very important point for plants already built. (6)

Greater flexibility. Chambers may be set with wares requiring different maturing temp. This is impossible in any tunnel kiln. (7) Ease of repairing. Kiln does not require stopping operations for any except major repairs. (8) Quality and cost. Produces highest percentage of quality ware at the least cost per unit. This is a final argument for any comparison.

C. W. P.

PATENT

Tunnel kiln. CONRAD DRESSLER. U. S. 1,509,195, Sept. 23, 1924. A tunnel kiln comprising a main chamber through which the goods to be treated are moved, means situated approx. at the center of said chamber for developing a high temp. therein, and gas propelling mechanism located within the kiln and associated with the forward heating zone of said main chamber and adapted by its propulsion to equalize the ht. distribution in said zone.



Geology

New uses of non-metallic minerals. W. M. MYERS. *The Ceramist*, 4, 99(1924).—The compn., occurrence, properties and uses of the following minerals are described: The andalusite group, beryl, spinel, and bentonite. (1) *Andalusite* occurs in a deposit of commercial importance in Mono County, Calif. It is so pure that no other treatment than crushing is necessary. The ore is transported by mule trains and wagon to the railroad and shipped to Detroit. Production at present amts. to 70 T. a week. At the pottery it is crushed in Blake jaw crusher, then milled in a Hardinge ball mill, passed over a Dings magnetic separator to remove the abraded iron and finally ground in a Hardinge pebble mill lined with special sillimanite porcelain and using balls of the same material to avoid contamination. The finely ground andalusite is mixed with other porcelain making mat. and ground wet to pass 300-mesh screen. The resulting batch is molded and fired at such a temp. that the andalusite inverts to sillimanite. (2) *Cyanite* occurs in deposits of commercial importance in Wyo. and Va. Commercial possibilities are not fully known. It inverts to sillimanite when heated to sufficiently high temps. (3) *Sillimanite*. The only known large deposits occur in India. (4) *Beryl*. The annual production does not exceed 10 T. It is found associated with feldspar and mica. Small amts. are shipped to Germany for use in the manuf. of beryllium salts and metal beryllium which is said to be used in the prepn. of certain alloys. (5) *Spinel* has been found in many scattered localities, but not in sufficient quantity to be of importance. Synthetic spinel is made by combination of magnesium oxide and alumina from the mineral aluminite. (6) *Bentonite* and *Montmorillonite*. The two are so similar that it is practically impossible to distinguish between the same. C. W. P.

Bauxite. J. T. FULLER. *Chem. Bull.* (Chicago), 11, No. 2, 31(Feb., 1924).—General article. J. J. H., JR. (C. A.)

Chemistry and Physics

Preparation of alkali silicate from calcined infusorial earth. E. KLEINSCHMIDT AND F. STEINBERG. Ger. 369,062, *Oil & Col. Trade Jour.*, 66, 1052(1924).—Infusorial earth, calcined out of contact with air, is treated with dissolved alkali, a clear, colorless soln. of alkali silicate being obtained.

Production of alumina. W. BOEHM. Ger. 369,826, *Oil & Color Trade Jour.*, 66, 1051(1924).—An elec. current is passed through a mixt. of clay with alkali lye, or with such alkali compds. as are capable of decompn. of a silicate.

A rapid method for the determination of true (or powder) specific gravity. W. HUGILL AND W. J. REES. *Jour. Soc. Chem. Ind.*, **43**, 986(1924).—(Meeting of English Ceramic Society, Sept. 18 and 19.) The app. used consists of a conical flask with a long neck, at the lower end of which is a wide bulb. At the bottom of the neck is the 250 cc. mark, and above the bulb the neck is graduated in sp. gr. from 2.00 to 2.70 so that the sp. gr. may be read off directly. Xylene is poured into the flask up to 250 cc. and exactly 100 g. of dry powder is then dropped gradually into the flask. After standing 2 mins. to let air bubbles rise, the sp. gr. is read off. Crushing the dry brick to pass a 30-mesh sieve yields results accurate within 0.01%. H. H. S.

Sedimentation of bentonite. H. F. COWARD. *Jour. Chem. Soc.*, **125**, 1470-4 (1924); *Jour. Soc. Chem. Ind.*, **43B**, 786(1924).—Bentonite readily forms milky suspensions by shaking with water after soaking for a few minutes. The suspensoid is negatively charged, and is reversibly coagulated by suitable addns. of electrolytes. The easy prepn. of these suspensions suggests their possible use as a mat. for colloid investigations. H. H. S.

Emilium. LOISEL. *Jour. Soc. Chem. Ind.*, **43**, 986(1924).—(Meeting of French Academy des Science, Sept. 15.) A new radio-active body to which is given the name emilium yields an emanation in the gas given off by thermal springs at Bagnoles de l'Orne, and in the granite rocks from which issue the springs. H. H. S.

Determination of magnesium in aluminum, zinc and lead alloys. B. FETKENHEUER AND A. KONARSKY. *Wiss. Veröff. Siemens-Konz.*, **3**, 19-21(1924); *Jour. Soc. Chem. Ind.*, **43B**, 791(1924).—The non-ammoniacal soln. is poured into KOH. $Mg(OH)_2$ is pptd., filtered, dissolved and after treatment with NH_4Cl , NH_4OH , NH_4HS , pptd. as phosphate. H. H. S.

Thermal conductivity and compressibility of several rocks under high pressure. P. W. BRIDGMAN. *Am. J. Sci.*, **7**, 81-102(1924).—Summary: The thermal condy. of pipestone, talc, Solenhofen limestone, basalt, Pyrex glass and rock salt has been measured up to 12,000 kg./cm.² at 30° and in most cases at 75° also. The condy. increases with rising pressure by an amt. which may vary from 0.1% per 1000 kg. at 30° for Solenhofen limestone to 3.6% for rock salt. Probably for the ordinary rock of the earth's crust the effect is not over 0.5% at ordinary temps. The abs. condy. and its pressure coeff. may either increase or decrease with rising temp. A simple hydrostatic pressure applied to substances of the character of those measured does not in general produce a uniform change of vol., but the effects are complicated. The relation between pressure and deformation may be affected by hysteresis in a direction the reverse of normal. This occurs in pipestone, Solenhofen limestone, and basalt in amts. varying from a few per cent to 18% of the whole deformation. Talc and pipestone show large differences of linear compressibility in different directions; this effect was not investigated for the other materials. Pyrex glass has an abnormal increase of compressibility at high pressures. The geol. consequences of the foregoing results are discussed.

L. W. R. (C. A.)

Decomposition of pyrite by heat. MLE. G. MARCHAL. *Bull. soc. chim.*, **35**, 43-7(1924).—Very pure pyrite, finely ground, was heated both *in vacuo* and in a current of N. *In vacuo* decompn. became evident at 500°. The loss of wt. was 1.22% per hr. at this temp. and increased to 2.03% per hr. at 550°. At 670-80° decompn. into S and FeS was complete in 8 hrs. The S deposits on the tube walls in cryst. form and high purity. The decompn. is rapid at 850°. At 1000° or higher the sulphide product corresponded closely to $FeS_{0.9}$. Heating in a current of N at 850° for 1 hr. gave complete decompn. into FeS and pure cryst. S. A. R. M. (C. A.)

Study of clays. V. The action of heat. O. BOUDOUARD AND J. LEFRANC. *Bull. soc. chim.*, **33**, 1627-40(1923); cf. *C. A.*, **17**, 3009.—The ignition loss of 7 clays and 2

halloysites, heated to various temps. from 182° to 1000°, was studied. The hygroscopic H₂O was evolved continuously and slowly up to 450°. The liberation of combined H₂O started at 450° and was complete at 500°. Some anomalies were noted. The halloysites showed, at about 800°, a further definite loss of H₂O. One of the clays in particular showed a similar loss of H₂O at 800°. C. H. K. (C. A.)

The estimation of chromium in nickel-chrome alloys. "METT." *Chem. Age* (London), 9, 364(1923).—Heat 0.2–1 g. of alloy in a Ni crucible with 10 g. Na₂O₂. Ext. the Na₂CrO₄ with water, make acid with HNO₃, neutralize with NH₄OH and then acid with AcOH. Ppt. PbCrO₄, filter, dissolve in 2 N H₂SO₄ and det. Cr volumetrically with FeSO₄ soln. and KMnO₄ in the usual way. W. T. H. (C. A.)

Behaviour of gases in contact with glass surfaces. D. H. BANGHAM AND F. P. BURT. *Roy. Soc. Proc.*, 105A, 481–8(1924).—The sorption of carbon dioxide by fine glass wool has been found to be very accurately represented by the equation, $s^m = kt$, where s is the amt. sorbed under a certain press. during the time, t , and the index, m , increases with the pressure. An equation showing desorption has also been deduced. Further, the quantities of sorbed gas in approx. equilibrium with a given pressure, have been found to be expressed by the Freundlich equation, $s^n = k'p$, where n is a constant charac. of the gas, being apparently larger the greater the soly. of the gas in water. M. S. B. (J. S. C. I.)

Calcium sulphate solutions. P. JOLIBOIS AND I. CHASSEVENT. *Compt. rend.*, 178, 1543–6(1924).—The soly. curve of CaSO₄, 1/2H₂O is traced in its metastable region and the rate of crystn. of the dihydrate from supersatd. soln. plotted. Seeding the soln. with the dihydrate starts immediate crystn., but the addn. of anhydrous calcium sulphate (calcined at 200–1000°) has no effect. The explanation of the setting of plaster of Paris, calcined at high temp., must, therefore, not be sought in the starting of crystn. but rather that transformation into the hemihydrate in contact with the soln. is slower the higher the temp. of calcination in consequence of a diminution in the active surface. J. W. B. (J. S. C. I.)

PATENTS

Process for producing and utilizing alkalis and alumina. ALFRED H. COWLES. U. S. 1,508,777, Sept. 16, 1924. A process of treating leucite, feldspar and like alkali-alumina-silicates, which consists in subjecting them to a sintering process with such proportions of sodium metal carbonate and an alkali earth metal carbonate as will give a sintered product containing one molecular weight of silica to two molecular weights of alkali earth oxide and less than one and seventy-six hundredths molecular weights of alkali metal oxide to one of alumina, and leaching the sintered product.

Process for the production of alumina and nitrates. HANS JOACHIM FALCK AND THOR MEJDELL. U. S. 1,507,993, Sept. 9, 1924. Process for the production of alumina and nitrates which consists in forming a mixt. of nitrates containing aluminum nitrate, mixing such mixt. of nitrates with an alumina-contg. mat. in such a quantity that the resulting mixt. will not melt during the subsequent htg., htg. said resulting mixt. in the presence of a basic subs. and working the product of the htg. opern. for the recovery of alumina and nitrates.

Process of producing aluminum chloride and sodium silicate. SAMUEL PEACOCK. U. S. 1,507,709, Sept. 9, 1924. The process of producing aluminum chloride, and sodium silicate, from naturally occurring aluminum silicates, which consists in calcining said silicates and mixing the same with sodium chloride; subjecting the mixture thus produced to a reacting temp. to produce the desired aluminum chloride and sodium silicate; passing free nitrogen over the charge to sweep out the volatile aluminum chloride and recovering said sodium silicate from the fur., substantially as described.

Fire-resisting paint. NEVIL MONROE HOPKINS. U. S. 1,507,181, Sept. 2, 1924.

The herein described new paint compn. consisting of a water soln. of sodium silicate in the proportions of $1\frac{1}{2}$ pints; sodium fluoride $\frac{1}{2}$ pint; 6 oz. finely divided asbestos and 6 oz. asbestine admixed with sufficient kaolin, and zinc oxide to increase the hiding power of the paint and sufficient coloring matter to provide a predetd. color thereto.

General

Pottery Expansion in United States breaks record in 1923. ANON. *The Ceramist*, 278(1923-4).—42 glost and biscuit kilns for general ware, and 6 double decorating kilns were built in the 12 months' period prior to December 4, 1923. This is a greater increase than any single year in the history of the industry. Notes relating to charges and improvements in individual plants. C. W. P.

Safety work in the pottery industry. The New Jersey State Industrial Safety Museum. LEROY W. ALLISON. *The Ceramist*, 249(1923-4).—A description of the purpose and equipment of the N. J. State Industrial Safety Museum with special reference to its exhibits and devices recommended for the ceramic industry. C. W. P.

Mineral industry of the British Empire and foreign countries. *Imp. Min. Resources Bur.*(1924).—Statistical Summary: Production, imports and exports, 1920-22.

O. P. R. O.

Swedish testing laboratory. *Indus. Australian and Mining Stand.*, 72, 249.—The Swedish Testing Laboratory at Stockholm announces that it is open to exporters from other countries desirous of having samples of any mat. tested when in doubt as to whether they comply with Swedish import regulations. The Testing Institute is managed by a board of directors and has skilled experts on its staff. O. P. R. O.

Standardization of scientific glassware. *Nature*, 114, 485(1924).—Units of volume, the first rept. issued by the Joint Comm. for the Standardization of Sci. Glassware records unanimous recommendation to discard the cc. as the standard unit for scien. glassware and to institute therefor the liter and the milliliter. As some chemists prefer the Mohr unit, the Comm. adds 2 further recommendations, to obviate confusion between the 2 systems, although it hopes that in time the liter and the milliliter will be adopted exclusively. It recommends that vessels graduated on the Mohr system should be marked "g. w. a." (grams of water in air) and the numerical relation between the units shall be 1000 g. w. a. = 1002 ml. Whereas the vol. of a body of simple geometrical form is readily calcd. from its linear dimensions, the vol. of a hollow vessel designed to hold a fluid is detd. more easily and more accurately by finding the wt. of water required to fill it. This has many disadvantages, especially if there is no simple numerical relation between them. To establish such a relation, the originators of the metric system defined the kg. as the mass of water which occupies one cu. decimeter at its temp. of max. d.; so that the unit of vol., the liter, could be defined either as a cu. decimeter or as the space occupied by a kg. of water at the specified temp. A cu. decimeter of water was not a practical standard wt., and the kg. was therefore redefined as the mass of a particular standard wt. (*kilogram des Archives*). In accordance with this change, the liter was redefined as the vol. occupied by one kg. of pure water at its temp. of max. d. and under normal atmospheric press. Thus the liter became independent of the metric unit of length, and the cu. centimeter lost its relation to the vol. of a mass of water. The relation between the liter and the cc. was found experimentally to be 1 liter = 1000.027 cc. (± 0.001), a difference so small as to be negligible for ordinary glassware. The introduction of the Mohr system caused confusion, inasmuch as by it the unit vol. was defined in terms of the apparent wt. in air of a mass of water at room temp. By this system a liter flask contains 1000 gm. of water (weighed in air against brass wt.) at 17.5°C, which is the equivalent of 1002 cc. as defined above.;

but the followers of Mohr designated the vol. occupied by 1000 gm. of water one liter, and $\frac{1}{1000}$ part of it one cc. The exact relation between the Mohr unit and the milliliter is given by the fact that the amount of water which weighs 1000 gm. in air of density 0.0012 gm./ml., when weighed against brass wts. of density 8.4 gm./ml., occupies a vol. of 1002.021 ml. at 60°F. The difference between this fig. and 1002, namely, 2 pts. in 100,000, is negligible in practice, and hence the Comm. recommends the adoption of the round number, thus facilitating inter-conversion of "g. w. a." and milliliters. The Comm. has also considered the accuracy of volumetric glassware, and recommends adoption of only two grades: Class A, or standard app., and Class B, or commercial grade app. The Class A Tests and the Class B Tests of the Nat. Phys. Lab. are approved. The Comm. urges that volumetric glassware should never be ordered without specifying the limits of accuracy required. O. P. R. O.

Heat losses from steam-line pipes. R. H. HEILMAN. *Blast Fur. Steel Plant*, **10**, 261-5(1922).—Data are given on bare pipes operating at temps. up to 427 together with curves and formulas, enabling ready solution of problems encountered in the calcn. of heat losses from bare and covered pipes. The general formula giving good results is $T_d = 272.5h/[h + 564/D^{0.10}]$. T_d = temp. difference between canvas surface and room (°F); h = total B. t. u. loss per hr. per sq. ft. of canvas; and D = outer surface diam. (inches). An example is given. W. H. B. (C. A.)

High-temperature electric furnace. ANON. *Chem. Met. Eng.*, **29**, 1149(1923); 1 illus.—A furnace was designed with solid graphite resistors. A special low-voltage transformer of large capacity is used. A high power input makes the necessary high temp. easily attainable, after which the power input is reduced to the working rate. The graphite resistors have a rather short life, which may be increased slightly by the injection of a small amt. of illuminating gas into the high-temp. chamber. W. H. B. (C. A.)

BOOKS

Reference List of Bibliographies: Chemistry, Chemical Technology and Chemical Engineering Published since 1900. Compiled by Julian A. Sohon and W. L. Schaaf. New York: H. W. Wilson Co. 100 pp. \$1.50. Reviewed in *Ind. Eng. Chem.*, **16**, 543 (1924). (C. A.)

HAINBACH, RUDOLPH: **Pottery Decorating.** New York: D. Van Nostrand Co. 2nd ed., revised. 256 pp. \$3.00. (C. A.)

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ABBREVIATIONS USED IN INDEX

| | | | |
|----------|-------------------------------|----------|----------------------|
| abs. | absolute | econ. | economical |
| a. c. | alternating current | ed. | educational |
| alk. | alkaline | elec. | electric, electrical |
| amt. | amount | e. m. f. | electromotive force |
| anal. | analysis | equil. | equilibrium |
| app. | apparatus | equiv. | equivalent |
| approx. | approximate, approximately | est. | estimate |
| at. wt. | atomic weight | estd. | estimated |
| av. | average | estg. | estimating |
| | | estn. | estimation |
| b. p. | boiling point | evap. | evaporate |
| B. t. u. | British thermal units | evapd. | evaporated |
| bldg. | building | evapg. | evaporating |
| Brit. | British | evapn. | evaporation |
| | | examd. | examined |
| cal. | calory(ies) | examg. | examining |
| calc. | calculate | examn. | examination |
| calcd. | calculated | expt. | experiment |
| calcg. | calculating | exptl. | experimental |
| calcn. | calculation | ext. | extract |
| Can. | Canada | extd. | extracted |
| cc. | cubic centimeters | extg. | extracting |
| ceram. | ceramics | extn. | extraction |
| charac. | characteristics | | |
| chem. | chemical (not chemistry) | f. p. | freezing point |
| cm. | centimeter(s) | ft. | foot, feet |
| circ. | circular | fund. | fundamental |
| Co. | Company | fur. | furnace |
| Comm. | Committee | | |
| coeff. | coefficient | gen. | general |
| compd. | compound | g. | gram(s) |
| compn. | composition | | |
| concd. | concentrated | htg. | heating |
| concn. | concentration | h. p. | horsepower |
| condy. | conductivity | hr. | hour |
| const. | constant | | |
| contd. | contained | in. | inch(es) |
| contg. | containing | indus. | industrial |
| c. p. | chemically pure | inorg. | inorganic |
| cryst. | crystalline (not crystallize) | insol. | insoluble |
| crystd. | crystallized | invest. | investigation |
| cu. m. | cubic meter(s) | | |
| | | kg. | kilogram(s) |
| d. | density | kw. | kilowatt(s) |
| d. c. | direct current | | |
| decompn. | decomposition | l. | liter(s) |
| det. | determine | lab. | laboratory |
| detd. | determined | lb. | pound(s) |
| detg. | determining | lit. | literature |
| detn. | determination | | |
| dil. | dilute | | |

| | | | |
|----------|----------------------|----------|----------------------------|
| mach. | machinery, machine | qual. | qualitative |
| mat. | material | quant. | quantitative |
| m. | meter(s) | | |
| manuf. | manufacture | ref. | reference |
| max. | maximum | refrac. | refractory |
| mfg. | manufacturing | rept. | report |
| meas. | measure, measurement | resis. | resisting |
| mech. | mechanical | resist. | resistance |
| mg. | milligram | resp. | respectively |
| min. | minute(s) | r. p. m. | revolutions per minute |
| mixt. | mixture | | |
| mol. | molecule, molecular | sat. | saturate |
| mol. wt. | molecular weight | satd. | saturated |
| m. p. | melting point | satg. | saturating |
| | | satn. | saturation |
| N | normal | scien. | scientifically, scientific |
| | | sec. | second(s) |
| org. | organic | sep. | separate |
| oper. | operate | sepd. | separated |
| operg. | operating | sepg. | separating |
| opern. | operation | sepn. | separation |
| | | sol. | soluble |
| p. d. | potential difference | soln. | solution |
| phys. | physical | soly. | solubility |
| physiol. | physiological | sp. | specific |
| Port. | Portland | sp. gr. | specific gravity |
| powd. | powdered | specif. | specifications |
| prac. | practical | sq. cm. | square centimeter(s) |
| ppt. | precipitate | stand. | standard |
| pptd. | precipitated | subs. | substance |
| pptg. | precipitating | | |
| pptn. | precipitation | temp. | temperature |
| prep. | prepare | tent. | tentative |
| prepd. | prepared | | |
| prepg. | preparing | v. | volt(s) |
| prepn. | preparation | vol. | volume (not volatile) |
| press. | pressure | | |
| prob. | problem | wt. | weight |

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

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Abrasives

Abrasive efficiency shown by tests. LLOYD HATCH. *Abrasive Indus.*, 5 [6], 140 (1924).—Methods pursued in the manuf. and testing of aluminum-oxide coated cloth are described. Special attention is given the effect of flexibility of the sheets on cutting value. Diagrams are shown which indicate that up to a certain point the cutting power increased with the flexibility. The data for the diagrams were obtained from readings on a mach. having a constant length of stroke combined with the constant press. of a block on a steel panel, the loss of wt. of which was detd. after each 50 strokes. The problem of wear resist. was also studied at the same time. P. D. H.

Corundum manufacturing data given. ANON. *Abrasive Indus.*, 5 [6], 157 (1924).—In the refining of natural corundum in an elec. fur. in an exptl. way, it is suggested that a copy of German patent specif. No. 85,021, issued Nov. 20, 1894 to Franz Hasslacher, Frankfort-on-Main, Germany, be obtained from the U. S. Patent Office, Washington, D. C. P. D. H.

Natural and artificial abrasives and their use in industry. B. KLEINSCHMIDT. *Apparatebau*, 36, 175-9(1924).—Descriptive, with 8 cuts of carborundum furnaces and app. for making grinding wheels. J. M. H. (C. A.)

Abrasives. ANON. *Mineral Ind.*, 32, 1-6(1923).—A review of the industry of abrasives, natural and manufd. A. B. (C. A.)

Cement, Lime and Plaster

Ferrites of calcium and barium. E. MARTIN. *Chim. et Ind.*, 406-7(1924); *Jour. Soc. Chem. Ind.*, 43, B867(1924).—On htg. the mixt. $\text{Fe}_2\text{O}_3\text{-CaCO}_3$ to a temp. not exceeding 1200° , monocalcium ferrite is formed: Fe_2O_3 , CaO. It has a density of 4, is magnetic and non-hydraulic, and is insol. in 10% acetic acid and in sodium carbonate and ammonium chloride solns. Excess of alumina decomposes it at 1200° , while with silica silico-ferrites are formed having properties neither of the ferrite nor of calcium silicate. The dicalcium ferrite Fe_2O_3 , 2CaO is formed by htg. the mixt. $\text{Fe}_2\text{O}_3 + 2\text{CaCO}_3$. It is attacked slowly by 10% acetic acid, is slightly sol. in boiling sodium carbonate soln. and entirely decomposed by hot ammonium chloride soln. If htg. of the above mixts. be carried to fusion the products differ in their chem. properties from the preceding ferrites. The product from the mono-mixt. has a density below 4, is magnetic, but is attacked slightly by water and 10% acetic dissolves out much lime. Barium compds. were studied because they are more easily prepared, BaO being more readily sol. than CaO. H. H. S.

Dehydration and re-hydration of gypsum. G. LINCK AND H. JUNG. *Z. anorg. Chem.*, 137, 407-17(1924); *Jour. Soc. Chem. Ind.*, 43, B870(1924).—Gypsum is converted at 99° into the hemihydrate which at 195° loses water and becomes "sol. anhydrite."

This subs. absorbs moisture from the air to reform the hemihydrate, a reversible reaction unaccompanied by any change in cryst. structure. In further testing, "sol. anhydrite" undergoes sudden transformation into anhydrite identical with the mineral. Above 1000° CaSO_4 dissociates liberating SO_3 ; the resulting mixt. of CaO and CaSO_4 forms flooring plaster. The setting of plaster of Paris consists first of the rehydration of "sol anhydrite" to hemihydrate, then the soln. of this compd. in water and, finally, crystn. of the dihydrate. H. H. S.

Note on "gas concrete." ANON. *Tegel* (Stockholm), 13, 91(1923).—A new highly porous building mat. invented by Axel Eriksson has been awarded the gold medal of the Swedish Academy of Engineering Science. It is a mixt. of Port. cement, burnt shale, and lime to which is added a catalyser. The H_2O of the mixt. becomes decomposed, the gas formed producing the porosity. The mat. attains a pumice-like structure; it has an excellent heat insulation; sp. gr. 0.7. A wall 20 cm. thick is said to give sufficient insulation for the climate of Sweden. Load carrying capacity and crushing strength, although low, are claimed to be high enough to permit the use of the mat. in small bldgs. without reinforcements. The mixt. of lime and burnt shale applied is considerably cheaper than Port. cement. The shale may be a combustible "alum shale" of which thick layers are found in S. Sweden. Factories for the production of the new mat. have been started; the mat. is being used in one of the largest new buildings, a sky scraper, in Stockholm. O. A.

Addition of fluorspar to cement-mix. H. KÜHL. *Zement*, 13, 3-5, 9-10, 18-20 (1924).—K. investigated the effect of fluorspar on 2 cements—one highly siliceous and the other highly aluminous; the fluorspar contained 88% of CaF_2 . The temp. at which an appreciable amt. of shrinkage occurred in the cement mixt. was measured, this shrinkage being regarded as showing the lowest temp. at which sintering took place with reasonable rapidity. Nacken had previously found that with normal cements it occurs at about 1270° . With both kinds of cement, noticeable shrinkage occurred at 870 – 910° with 5% of fluorspar, a larger proportion having no further action. With less than 5% the effect on the shrinkage temp. was greater with a siliceous cement than with an aluminous one, but the difference was not of practical importance. On overheating the shrunk material, much blistering and swelling occurred. The aluminous cement-mix when heated with fluorspar did not disintegrate except when the burning temp. was about 1150 – 1250° and very large proportions were used. The siliceous cement-mix with 5% of fluorspar produced a dense and stable clinker at 850 – 1150° ; when heated to 1350° and cooled, it disintegrated, but after firing at 1430° it did not disintegrate. Mixts. contg. larger proportions of fluorspar behaved similarly, though at different temps. It is suggested that between 1100° and 1300° dicalcium silicate is formed and is the material which disintegrates, whereas at higher temps. the stable tricalcium silicate is formed. The cause of the discoloration of mixts. contg. fluorspar is not known; the discoloration occurs only when they are heated slowly; with rapid heating, such as occurs in com. firing, the discoloration is not produced. Under normal conditions of burning, no loss of F occurs, but when a temp. of 1600° is reached the clinker is devoid of F. The siliceous cement contg. fluorspar set unusually slowly, but the corresponding aluminous cement set very rapidly. Cements which, when rapidly fired, would not stand the boiling test showed no signs of cracking when 5% of fluorspar was added to the mix prior to burning. The addn. of fluorspar has no effect on the strength of the cement at 28 days. The addn. of 5–10% of fluorspar thus reduces the temp. required to form cement clinker from 1270° to about 1100° without having any serious disadvantages, except that the cement sets more slowly. B. C. A. (C. A.)

The thermal phenomena which accompany the setting of plaster. L. CHASSEVENT. *Compt. rend.*, 179, 44-6(1924).—A calorimetric study of the setting of plaster has been

made in order to differentiate between the different reactions which take place during this process. There have been studied: (1) the liberation of heat due to the hydration of CaSO_4 which had been dehydrated at different temps., from 200° to 500° , as a function of the weight of the material and of the time, (2) the liberation of heat due to the hydration of the semi-hydrate. The following values have been obtained: heat of transformation of CaSO_4 to $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ + 2770 cal.; heat of soln. of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ at 19° 3400 cal.; heat of crystn. of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ at 19° from 400 to 700 cal.

J. H. P. (C. A.)

Super-cements. OTTO GRAF. *Z. Ver. deut. Ing.*, **68**, 853-6(1924).—Port. cement and other higher-grade cements are compared from the standpoint of the construction engineer. In general the super-cements are preferred for their greater strength, early high strength, resistance to chem. action, and low shrinkage. They are less desirable for their low elasticity, dark shade and high cost. As to the effect of the water/cement ratio in the mix and also the time of set they are similar to Port. cement. Few new data are given.

H. F. K. (C. A.)

Fused cement. NITZSCHE. *Zement*, **13**, 136-7(1924).—The action of 7.5% MgSO_4 soln. on fused cement briquettes was very slight during a 12-month period. At 90 days tensile strength of 34.7 kg. per sq. cm. and crushing strength of 702 kg. per sq. cm. were attained. On longer immersions the former strength increased while the latter decreased slightly. The contraction of specimens of both neat fused cement and of 1:3 mixes with sand in a 2.4% MgSO_4 soln., allowance being made for intermittent immersions and drying periods, was the same as that of check pieces in tap water.

H. F. K. (C. A.)

Silicic acid in Portland cement. F. HART. *Zement*, **13**, 78-9(1924); See *Ceram. Abs.*, **3** [11], 312.—Additional expts. confirm H.'s previous conclusions that orthosilicic acid occurs in Port. cement. A sample of cement which showed "dusting" revealed in the dehydration curve of its gel breaks at 35.69% and 31.27% H_2O , corresponding to orthosilicic acid and $2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$. The dehydration curves of gels of separates retained on and passing 5000 meshes per sq. cm. showed 1 break at 37.9% and 2 at 37.7% and 33.1% H_2O , resp. This supports the current opinion that a silicate low in CaO causes the "dusting" of cement.

H. F. K. (C. A.)

The products of hydraulic hardening and the hypothesis of their formation. HANS KÜHL. *Zement*, **13**, 362-4, 375-6(1924).—In addn. to the usual compds. K. finds $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ crystd. in minute octagons and also $4\text{CaO} \cdot 3\text{SiO}_2 \cdot n\text{H}_2\text{O}$. A difference in the products results from adding normal or excess amts. of water to cement. Any mixt. of active CaO , Al_2O_3 and SiO_2 will set, but the d. and especially the time of set will det. its fitness as a cement. K. holds that the greatest strength can only be obtained through the simultaneous formation of cryst. and gel hydration products. Compn. ranging from Portland to alumina cements can be used safely and made economically if sufficient CaF_2 (5-15%) is added to the clinker.

H. F. K. (C. A.)

PATENTS

Process of making cement and by-products. EDWIN C. ECKEL. U. S. 1,511,323, Oct. 14, 1924. The process of making cement and iron, comprising fusing a mixture of lime and titaniferous iron ore in a furnace, tapping off the resulting iron, and cooling and grinding the remaining cement slag.

Enamels

Testing enameled objects. OTTO RINO ANGELUCCI. *Giorn. chim. ind. applicata*, **6**, 167(1924).—Fill the enameled vessel to be tested with a soln. of an electrolyte or even with water. Connect the ends of the secondary of an induction coil so that one end is in contact with the metallic part of the vessel and the other end with the liquid

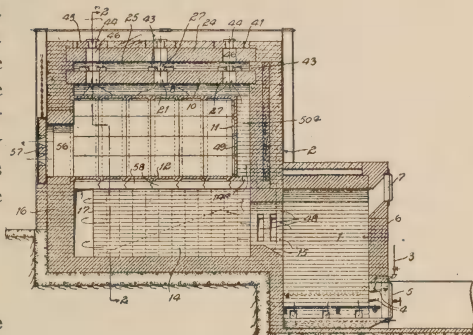
contained in it. When the primary circuit is closed sparks form between the end of the secondary immersed in the liquid and that part of the metal not covered with enamel, even if such surface is a fraction of a mm.² If there is no metal exposed the secondary circuit is interrupted and the current does not pass.

R. S. P. (C. A.)

PATENTS

Enamel composition. HUGH S. COOPER. U. S. 1,510,829, Oct. 7, 1924. An enamel compn. adapted to produce a substantially white opaque coating on metals, said compn. contg. a cerium compd. and a compd. of another rare-earth element occurring in monazite sand as opacifying ingredients.

Enameling furnace. ALBERT F. H. SEELIG. U. S. 1,515,368, Nov. 11, 1924. In a fur. of the kind described, the combination of a htg. chamber, a muffle supported therein, and means for directing the hot gases in a plurality of passes and in opposite directions under and in direct contact with the bottom of the muffle.



Glass

The effect of composition on the viscosity of glass (Part II). S. ENGLISH.

Jour. Soc. Glass Tech., 8 [31], 205(1924).—An investigation on the viscosity of the same series of glasses that were used in Pt. I of this study. In the present investigation an entirely different type of app. is used, and the temp. is extended up to 1400°C. Viscosity detns. of the various glasses at progressively increasing temps. are tabulated and viscosity-temp. curves are presented. The simple two component glasses, from which all the glasses used in this investigation were derived by substitution were two sodium silicates, one having a molecular composition of: $6\text{SiO}_2 \cdot 2\text{Na}_2\text{O}$; the other being: $4\text{SiO}_2 \cdot \text{Na}_2\text{O}$. In the case of the soda-lime-silica glasses, throughout the whole range of temp. from the annealing points of the glasses up to 1400° the molecular replacement of sodium oxide by calcium oxide in a sodium trisilicate until the basic and alkaline oxides are present in equimolecular propns. causes a continuous increase in the viscosity at any particular temp. Also the increase of temp. necessary to cause a reduction of the viscosity by one half increases very rapidly as the temp. is raised. The curves resulting from the study of the soda-magnesia-silica glasses show that throughout the whole range of temp. investigated the substitution of sodium oxide by magnesia in a sodium trisilicate causes a very marked increase in viscosity. Substituting sodium oxide in a sodium trisilicate by magnesia causes a distinct increase in the rate of setting over this particular range, but the effect is not nearly so great as in the case of the lime containing glasses. In the case of the soda-alumina-silica glasses the curves show that for equimolecular substitutions, alumina causes an increase of viscosity about 8 or 9 times as large as that caused by lime and about 4 times as large as that caused by magnesia. Alumina also reduces the rate of setting of the glass, and for this reason is beneficial in producing better working properties in glasses. In the substitution of boric oxide for silica, as the substitution proceeds the rate of setting of these glasses increases very rapidly. Also, the greater the proportion of boric oxide present the more pronounced is the reduction in viscosity.

J. G. P.

Further investigations of the influence of alumina on the properties of glass. VIOLET DIMBLEBY AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 8 [31], 173(1924).—

Two series of soda-alumina-silica glasses were prepd., one contg. approx. 18%, the other 14.5% of soda, and amounts of alumina in substitution of the silica rising from 0 to 19.69% in the first and 0 to 15.50% in the second series. The properties of the resulting glasses with variable alumina contents were then made. Replacement of silica by alumina up to about 10% results in a slight rise in annealing temp.; beyond a substitution of 10% the rate of increase of annealing temp. is considerably greater. The substitution of silica by alumina is without appreciable effect on the linear coeff. of thermal expansion. Introduction of alumina instead of silica results in a steady increase in the density, the average increase for each per cent substitution being 0.00356 in the series containing about 18% of soda and 0.00407 in that contg. about 14.5%. J. G. P.

The decay of window glass from the point of view of lichenous growths. ETHEL MELLOR. *Jour. Soc. Glass Tech.*, **8** [31], 182(1924).—The botany and history of lichens as pertaining to their effect on window glass is taken up. J. G. P.

Some observations on the influence of titania on the properties of glass. A. R. SHEEN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **8** [31], 187(1924).—A series of titania contg. glasses were prepd. of general compn. $6\text{SiO}_2 \cdot x\text{Na}_2\text{O} \cdot y\text{TiO}_2$, where $x + y = 2$, and in which the percentage of titania reached 19.4. It is necessary to melt such glasses in a non-reducing atmosphere, otherwise colors are obtained ranging from light yellow, through amber, to dark brown. For this reason titania might be employed for producing yellow or amber colors in glass. No difficulty occurs in working glasses of the above type even with 10 to 15% of titanium oxide, but difficulties do occur above this concentration, the glass being very viscous and setting very rapidly. When titania replaces sodium oxide the resist. of the glass to the attack of boiling water increases rapidly and the glasses are almost as equally resistant as those contg. the same percentage wt. of magnesia. When the amt. of titania present is between 10 and 19.5% the resist. rises and becomes ultimately superior to several of the best commercial resistant glasses. Progressive introduction of titania into a glass of the type examined does not appear to improve the resistance to caustic alkali soln. until 10% is present, but at that and subsequent stages the improvement is marked. In this respect titania glasses are superior to high silica glasses. The annealing temp. of titania-contg. glasses increases rapidly with increase in titania content, the rate of increase being greater than for corresponding glasses containing lime, magnesia or alumina. Considerable reduction in the thermal expansion occurs on replacing sodium oxide by titania. The oxide is not so effective as magnesia in this respect, and is very distinctly inferior to silica and boric oxide. From our expt. it appears, however, to have a favorable influence on the thermal endurance. The refractive indices of titania glasses are higher than those of corresponding lime glasses. The total dispersion is considerably greater than exhibited by lime glasses, the total dispersion increasing slowly with concentration. The densities of the titania glasses have also been detd. Finally, over the range investigated, no evidence has been forthcoming of similarity of behavior between boric oxide and titania in giving maxima and minima on the curves showing the relationship between compn. and phys. properties. J. G. P.

Colored glasses. A. GRANGER. *Chim. et Ind.*, 408–10(1924); *Jour. Soc. Chem. Ind.*, **43**, B870(1924).—Colors may be due to chem. action or to colloidal distribution in a colorless glass. Cobalt is said to be the only stain which has a purely chem. action. The red, pink, brown, yellow, colors produced by gold, selenium, carbon, sulphur, etc., are colloidal. Copper red is said to be due to metallic copper and not to cuprous oxide. At high temps. the stable form is Cu_2O but on cooling it becomes CuO and Cu .

H. H. S.

Process for the elimination of iron from the raw materials of ceramic and glass products. ORAZIO REBUFFAT. *Atti congresso naz. chim. pura applicata*, 1923, 282–3.—

Unlike purely phys. methods (levigation, magnetic sepn., etc.) used in the past for removing Fe from raw materials of the glass and ceramic industries, a new method is described which depends on *chem. sepn.* Fe compds. in clay, kaolin and sand which cannot be removed physically can often be completely dissolved out by HCl, but in other clays this treatment is unsuccessful. On the other hand the Fe in kaolin, clay, bauxite, siliceous sand and feldspathic silica can be completely and easily removed by treatment with $H_2S_2O_4$. The reaction is rapid and quant., only the theoretical amt. of acid based on the Fe being required. The sol. Fe^{++} salt is removed by filtration or by decantation in the presence of dil. H_2SO_3 to prevent reprecipitation of a basic Fe salt. Grades of kaolin and sand hitherto useless for glass and ceramics can be rendered suitable for white products.

C. C. D. (C. A.)

The electromotive properties of glasses. HANS SCHILLER. *Ann. Physik*, **74**, 105-35 (1924).—Samples of 5 different kinds of glass were tested. Each sample was in the form of a small tube with a spherical bulb blown at one end. The tube was filled with a soln., such as NaCl, and suspended so that the bulb was immersed in a beaker filled with the soln. The elec. connections were arranged so as to avoid various errors which have occurred in previous investigations. The results showed that the application of high field strengths (100 or more v.) produced counter e. m. f.s in the glass of the same order of magnitude as the applied potential difference. The results are correlated with those of Horovitz (C. A., **18**, 193). The possibility of characterizing any variety of glass by finding its "solution pressure" is discussed.

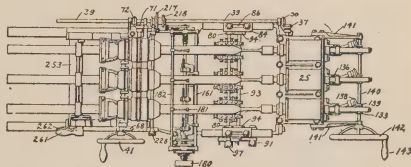
W. W. S. (C. A.)

The cause of the color produced in glasses of anhydrous borax and sodium metaphosphate by fusion with metallic oxides. THEODORE COHN. *Chem. News*, **129**, 32-5 (1924).—Oxides of different metals were added to microcosmic salt or borax and fused in a loop of Pt wire. Observation of color was made in daylight against a glazed white tile. The salts of Au, Ag and Pt impart a color which is due to colloidal free metal, and which varies with the concn. of metal and heat treatment. The colloidal metal may be pptd. by suitable reagents. With Co, Ni and Cu the color is due to the formation of metallic metaborates and pyrophosphates. No orthophosphates are formed as long as the beads are transparent. Colorless beads of Na metaphosphate contg. colorless cuprous phosphate in solid soln. are decompd. by H_2O to form cupric phosphate and metallic Cu.

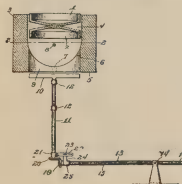
M. O. L. (C. A.)

PATENTS

Multiple glass-blowing machine. ALEXANDER KANN. U. S. 1,511,889, Oct. 14, 1924. In a device of the class described, the combination of means for gripping a plurality of glass tubes at their opposite ends, means for rotating said gripping means, heating means intermediate the ends of said tubes, and means associated with said gripping means for uniformly forcing the same amount of air into each of the tubes. In a device of the class described, the combination of means for gripping and rotating a glass tube, burners for heating said tube, brackets in which said burners are rotatably mounted, a shaft upon which said brackets are mounted, manipulative means for moving said shaft vertically.



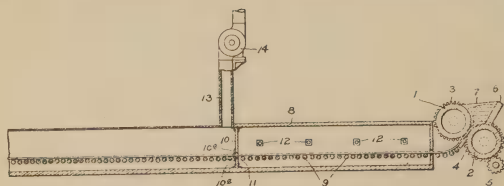
Cleaner for glass pots. WILLIAM WESTBURY. U. S. 1,511,550, Oct. 14, 1924. In combination with a melting kiln, and a pot adapted to be disposed in inverted position therein, a scraper for removing glass from the inverted pot within the kiln, and means for actuating said scraper.



Glass. FRED M. LOCKE. U. S. 1,510,521, Oct. 7, 1924. A

glass contg. over 78% of silica, under 5% of alkali, alumina, an alkali earth, and boric oxide, and having a coeff. of expansion substantially .0000032.

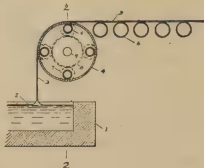
Process and apparatus for forming and annealing sheet glass. FREDERICK GELSHARP. U. S. 1,513,544, Oct. 28, 1924. In combination with means for forming and



feeding ahead a ribbon of plastic glass, of a leer in line therewith provided with rollers for advancing the ribbon therethrough, baffle means extending from the upper side of the glass to the ceiling of the leer and from the lower side of the glass to the floor of the leer for

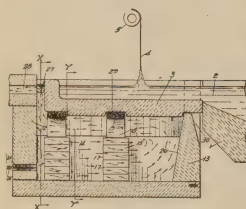
dividing the leer into an annealing end and a cooling end, and means to cause the rapid cooling of the ribbon during its last period of travel through the leer.

Apparatus for making continuous sheet glass. JOSEPH P. CROWLEY. U. S. 1,514,953, Nov. 11, 1924. In an app. for drawing continuous sheet glass, a bending device for the sheet, comprising a rotatable drum, and roller supporting means for the drum through which means the drum is frictionally driven.



Sheet-glass-drawing furnace.

ENOCH T. FERNGREN. U. S. 1,515,021, Nov. 11, 1924. In a sheet glass drawing mach., the combina-

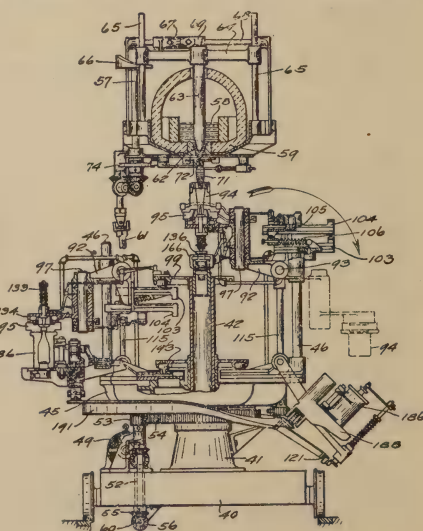


tion with the draw-pot contg. the molten glass from which the sheet is drawn, and the heating chamber beneath the pot, of a supporting stool for the pot located in the hgt. chamber, comprising a series of open arches, each alternate arch being inverted and each adjoining pair of arches having one limb in common, the pot resting on the crowns of the upright arches,

and a series of piers on which the crowns of the inverted arches are supported, the bottom of the pot being cut away where it rests upon the stool, to provide a more uniform thickness of mat. between the molten glass and the hgt. means in the chamber.

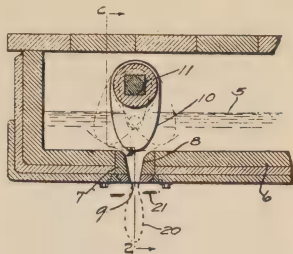
Glass-forming machine. LEONARD D. SOUBIER. U. S. 1,512,372, Oct. 21, 1924. In a glass forming machine, the combination of a rotating carriage, blank molds, inverting heads by which the blank molds are carried, said heads connected to rotate with the carriage, means to swing said heads about horizontal axes for inverting the blank molds and bringing them to a charge receiving position at the center of the machine, finishing molds, supporting devices therefore connected to rotate with the carriage, and a track on which said devices run, said track formed to lower the finishing molds into position to clear the blank molds and their inverting heads and to move the finishing molds upward into position to receive the blanks when the blank molds are opened.

Glass feeder. LEONARD D. SOUBIER.



U. S. 1,512,373, Oct. 21, 1924. A container for molten glass having a discharge opening extending through the floor thereof, a regulator to control the discharge of glass, said regulator comprising a body of refractory material extending downwardly in the glass above the opening, and means to oscillate said body about a horizontal axis and thereby swing the lower end thereof to and from a position directly over and adjacent to the outlet.

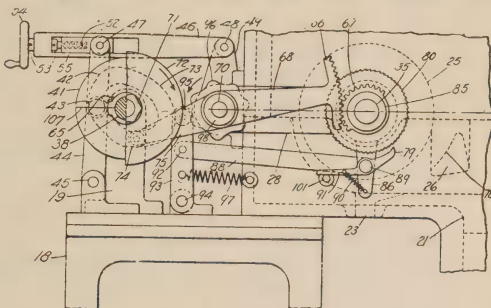
Glass feeder. LEONARD D. SOUBIER. U. S.



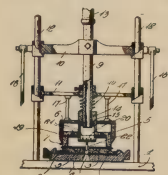
1,512,374, Oct. 21, 1924. The combination of a container for molten glass having an outlet orifice in the bottom thereof, the walls of the orifice consisting of material to which the glass will not adhere, and means to control the discharge of glass through the outlet comprising a body projecting into the glass, and consisting of material to which the glass will not adhere, said body having a tip formed of refractory material to which the molten glass adheres.

Apparatus for separating molten glass into mold charges. WILLIAM A. LORENZ. U. S. 1,514,059, Nov.

4, 1924. App. for segregating molten glass into mold charges, comprising a container having a submerged outlet, a drive shaft, a driven shaft connected with the drive shaft, a sleeve surrounding said driven shaft, a rocking device pivoted upon said sleeve, an impeller rotatably mounted on said rocking device adjacent to the outlet, means on said drive shaft for oscillating said rocking device to move the impeller toward and from the outlet, a pawl and ratchet mechanism for advancing the impeller step by step about its axis of rotation, a second rocking device for actuating said pawl and ratchet mechanism, and a member mounted on said driven shaft for actuating said second rocking device.

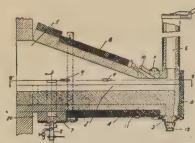


Glass blowing and trimming machine. RAYMOND F. HANCOCK. U. S. 1,513,756, Nov. 4, 1924. A machine of the class described comprising a die for supporting a pliable sheet, a blow-head for application to the sheet to force it into conformity with the die, and an edge trimmer for the sheet surrounding said blow-head.



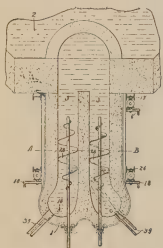
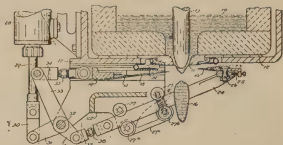
In a machine of the class described, the combination of a die for supporting a pliable sheet, and a blow-head for application to the sheet to force it into conformity with the die, said blow-head being provided with a fluid pressure supply, a recess opposite a portion of said sheet and said die, and orifices leading from said fluid pressure supply to said recess, said orifices discharging toward a wall of said blow-head.

Method and apparatus for delivering viscous glass. OLIVER M. TUCKER AND WILLIAM A. REEVES. U. S. 1,512,566, Oct. 21, 1924. A spout for delivering viscous glass from a furnace comprising a body portion with a delivery aperture therein, and ports for the introduction of a temperature controlling medium, said ports being directed



both inwardly toward the furnace, and outwardly toward the outer end of said spout. In spout structure for delivering viscous glass, a glass trough, a U-shaped channel member for the reception of a temperature modifying medium, the vertical legs of said U-shaped channel member extending upwardly through the vertical side walls of said spout and passing through the sides of the spout above the glass line for the delivery of said medium into the spout above the glass.

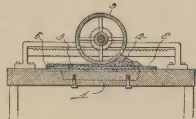
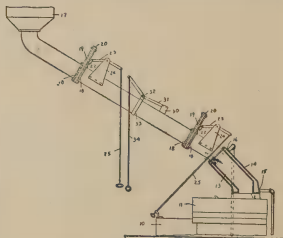
Glass-cutting apparatus. ENOCH T. FERNGREN. U. S. 1,512,412, Oct. 21, 1924. In glass feeding app., the combination of a container for molten glass having an outlet opening in the bottom thereof, cutters arranged beneath and at opposite sides of said opening, one of said cutters mounted to reciprocate horizontally, and consisting of a flat blade having a V-shaped notch forming a cutting edge, said blade being forwardly and upwardly inclined, a carrier for the other blade mounted to reciprocate in an inclined direction by which it is moved downward as it advances, and means to actuate said blades and cause the first mentioned blade to advance more rapidly than the second blade, the downward inclination of the direction of movement of the second blade being greater than the inclination of the first mentioned blade to compensate for the relatively rapid movement of the first mentioned blade.



Automatic glass-feeding machine. THOMAS WILLIAM WARREN. U. S. 1,512,383, Oct. 21, 1924. In a glass feeding device the combination of an extension adapted to align with an aperture in the wall of a glass tank, a body portion thereto, two enclosed channels with semi-circular bottoms, a screw conveyor in each channel, two chambers with raised floors opening therefrom, with controlled outlets from each chamber.

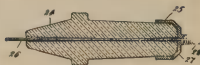
Feeding device for glass furnaces. FORREST L. HITCHCOCK. U. S. 1,512,223, Oct. 21, 1924. A feeding device for glass furnaces and the like having a permanent opening therein, comprising a feed

pipe extending downwardly in position to be at all times in instant communication with said opening, means for supplying material to said pipe for discharging into said furnace, a sliding gate valve mounted on said pipe so as to extend therein and close the same, a bell crank lever pivotally mounted on said pipe, a link connecting said bell crank lever and said gate valve, and means connected with said bell crank lever and extending to within reach of the operator for permitting the same to be operated so as to open and close said valve.



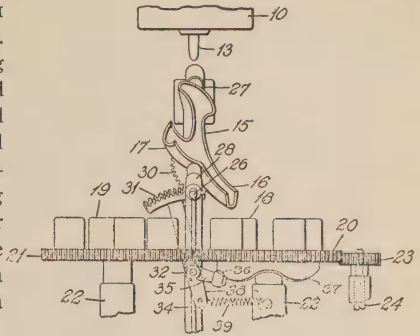
Glass-rolling pallet. HARRY F. ANDERSON. U. S. 1,513,731, Nov. 4, 1924. A pallet upon which glass is rolled into sheet form, having a portion of its surface provided with an anchoring field to which the glass will cling when pressed into engagement therewith during the rolling operation, whereby to prevent the glass from creeping along the pallet during the rolling operation.

Process for producing glass forms. OSCAR A. BOEHM. U. S. 1,512,013, Oct. 21, 1924. The process of producing glass forms having a bore which comprises heating a portion of a glass form having a bore open at one end and closed at the other thereby causing a contraction of the bore in the vicinity of the heating, causing a forming plunger to have a reciprocating

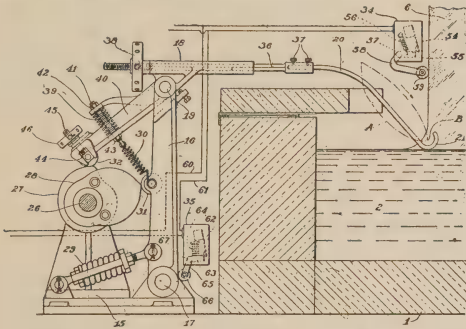


movement within the bore during the heating operation and forming an opening in the closed end of the form.

Glass-delivering apparatus. WILLIAM H. HONISS. U. S. 1,514,526, Nov. 4, 1924. App. for handling molten glass, comprising a feeder, a Y-shaped delivery trough mounted to receive the glass on the stem of the Y and having its fork inclined downwardly, a pivotal mounting for the trough having its axis approximately coincident with the receiving portion of the trough, molds, means for positioning the molds alternately on each side of said axis, and means for rocking the trough on its axis to lower the forks alternately in time with the positioning of the molds.

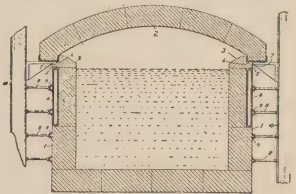


Edge-holding device for sheet glass. JOSEPH H. REDSHAW. U. S. 1,514,338, Nov. 4, 1924. The combination with apparatus for drawing a sheet of glass from a molten bath, of means for preventing the inward movement of the edge of the sheet comprising a pair of fingers spaced apart to receive the edge of the sheet, and driving means including an electric motor for moving the fingers at intervals downward into the glass bath and outward, a device comprising a member yieldingly pressed against the edge of the sheet and a switch operable therefrom for governing the supply of current to said motor so that the motor is

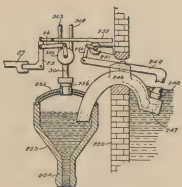


stopped when the edge moves out beyond a predetermined point, and is started when it moves in beyond a predetd. point, and means for preventing the stopping of the motor until said fingers are withdrawn from the glass bath.

Water-cooled glass-tank furnace. ARNO SHUMAN. U. S. 1,514,307, Nov. 4, 1924. In a water-cooled glass-tank furnace the combination of a side wall provided at its top with an external cavity, a water-cooled box arranged in the cavity and having its top flush with the top of the side wall, a roof spaced from the side wall, and a stone as 3 extending from the inner face of the tank between the top of the box and roof and stopping the space, substantially as described.



Method and apparatus for flowing molten glass. CLYDE R. LOTT. U. S. 1,514,091, Nov. 4, 1924. The



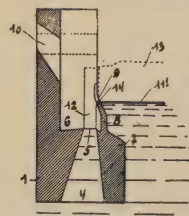
combination of a tank to contain molten glass, a stationary charging receptacle arranged to the side of and whereby to receive the glass from the tank, the tank having an outlet in its side at a point above the normal level of the glass in the tank, means for controlling the discharge of glass from the charging receptacle, means for controlling the discharge of glass from the tank through its outlet into the charging receptacle, common actuating means for both of said first-mentioned means whereby they operate in

synchronism and at stated intervals, and shears periodically operating to sever the glass discharged from the charging receptacle.

Alumina and other compounds for glass manufacture. R. L. FRINK. Brit. 215,810, Jan. 15, 1923. Kaolin, clay, shale, coal refuse, feldspar or other Al-silicate-contg. material is heated to a reacting temp. with an alkali chloride and an alk. earth by means of glass-furnace gases or other gases contg. H_2O vapor and C and S oxides. The reaction products are leached with H_2O and the insol. residue, which may be Ca silicate or a Ca Al alkali silicate, may be used for the manuf. of glass. The soln. is treated with the heating gases which produce pptd. alumina. The remaining soln. comprises carbonate and sulfate, which may be used together in glass making or may be sepd. An app. is described. (C. A.)

Desilvering fragments of silver mirrors. A. STERNBERG. Ger. 391,131, Feb. 26, 1924. Fragments of mirrors (silvered by reduction of silver soln.) cannot be used up in glass works owing to their silver content. On the other hand the silver content is so small that a regeneration by dissolution would be too expensive. Fragments of mirror are treated with dil. H_2SO_4 or with $NaHSO_4$ soln. for several hrs., the liquid is decanted and the fragments are dried in the open air at 120° . Care must be taken that the temp. does not rise to 180° or higher, because in that case the Ag is converted to sulfate. By agitating the dried fragments in water, the silver particles are sepd. and can be filtered off. To produce Ag salts the fragments are placed in an earthenware pot having a double bottom and the space below the perforated false bottom is filled with dil. HNO_3 . The pots are placed in a chamber heated to 120 – 130° , and the vapors from the boiling acid convert the Ag to nitrate. (C. A.)

Means for the manufacture of glass in continuous sheets. EUGENE ROWART. U. S. 1,515,174, Nov. 11, 1924. The process of drawing a glass sheet from a mass of molten glass, the said process consisting in lifting vertically first from the said mass two narrow strips of glass from a point below the level of the mass of molten glass, the said strips being lifted at a distance from each other corresponding to the width of the glass sheet which is to be produced, then lifting the sheet of glass from the mass of molten glass between the said strips, whereby the said strips become united with the glass sheet



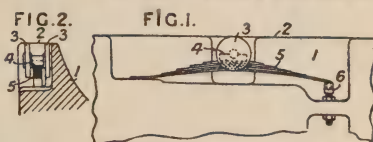
and finally lifting simultaneously the sheet and strips. In app. for the drawing of glass in continuous sheets, the combination with a glass container, of two refractory pieces arranged at a distance from each other corresponding to the width of a sheet of glass which is to be produced, a hollow space in each of the said pieces, the said hollow space being open in one face of the piece, a passage in the bottom of each piece, the said passage ending by a drawing hole in the said bottom, a lip in the front face of each piece, the said lip being inclined and gradually thinner towards the hollow space and

provided with a groove, the bottom of which is at a level above the bottom of the hollow space of the piece, means for immersing the said pieces into a mass of molten glass in the container, whereby two narrow strips of glass may be lifted from the bottom of the hollow space of the refractory pieces before the molten glass in the container has reached the bottom of the groove in the inclined lip, the said strips uniting with the sheet of glass lifted from the mass of molten glass, between the said inclined lips.

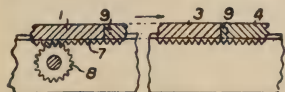
Method and apparatus for the manufacture of glass plates. FRANK L. O. WADSWORTH. U. S. 1,515,450, Nov. 11, 1924. In app. of the class described the combination of a Janus faced table, means for depositing masses of molten glass at either end of said table, means for rolling out said masses to sheet form in alternately reversed direction thereon, means for reversing the table between successive rolling operations so as to reciprocally expose the opposite faces thereof to the heating effects of the molten glass,

means for symmetrically cooling said faces by currents of cooling fluid flowing in the direction in which the last formed sheet was spread, means for pressing the successive sheets while they are supported on the alternately presented table surfaces and means of transferring the pressed plates from the said supporting surfaces to a plurality of leers each of which comprises a connected series of annealing chambers.

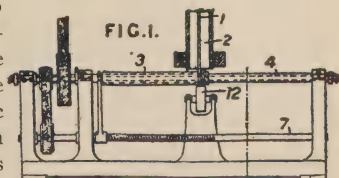
Grinding glass. PILKINGTON BROS., LTD., GLASS WORKS AND F. B. WALDRON. Brit. 25900/22. In a machine for the continuous grinding of glass plates, in which a series of tables carrying the glass pass under the grinding-runners, the sliding friction between the tables and the guides is in part replaced by rolling friction. The tables slide on guide-surfaces 2, and the rolling-friction devices, which are located at intervals along the machine, each comprise a wheel or roller 3, which may be double as shown in Fig. 2, supported in a bearing 4 fixed to a spring 5. The spring rests at one end thereof on the machine frame 1, and at the other end is pivoted to a bolt 6, the upward pressure of the wheel upon the table being varied by adjustment of the bolt. Counterweights may be employed in place of the springs, or wheels may be mounted in spring-supported journals on the table, and run on tracks adjacent to the guides. The upward pressure of the wheels on the tables may be adjusted so as to be a maximum at the starting end of the machine, whereby the pressure between the tables is more nearly equal throughout the machine.



Grinding and polishing glass. PILKINGTON BROS., LTD., GLASS WORKS AND F. B. WALDRON. Brit. 26526/22. In apparatus for the continuous grinding and polishing of plates of glass, in which the plates are mounted on a series of tables moving continuously under grinding and polishing discs, the tables being removed after passing the last disc, and a new table added to the series, the tables are frictionally registered to prevent relative movement therebetween and the consequent breakage of the plates which overlap the juncture between two tables. The frictional registering is obtained by moving the tables by a drive applied to the last one added only and communicated from one table to the next through the abutting ends; thus tables 3, 4 are the first in the series, and table 1 is the last one added, the drive, which is through a pinion 8 and rack 7, being applied to table 1 only. The pressure between the abutting ends of the tables is sufficient to prevent relative movement. The friction between the tables may be increased to allow for the different grinding pressures at different sets of grinders, by shaping the ends of the tables to give greater intensity of pressure. Registering devices 9 may be provided.

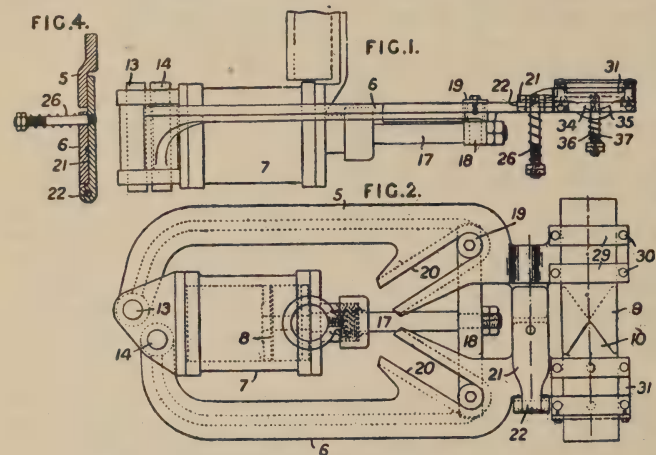


Forming silica glass articles. BRITISH THOMSON-HOUSTON CO., LTD. Brit. 22934/23. Relates to the production of tubes from fused quartz and consists in winding cane or strip quartz while plastic upon a mandrel, so that adjacent coils are in close proximity, and subjecting the coils, while still plastic, to pressure on the mandrel to cause them to coalesce. The strip or cane 1 of quartz glass is passed through a tubular electric heater 2, and is wound on a carbon mandrel 3 which is mounted on a rotatable shaft 4. The mandrel is fed forward by a loading-screw 7 so that the cane coils uniformly on the mandrel. The shaft 4 may be electrically heated, and a flame from a blowpipe may be directed on to the cane as it coils on the mandrel. A roller 12 presses against the plastic quartz helix and causes the coils to coalesce and form a tube.



Glass manufacture. RYLETT'S LONDON SECRETARIAT (SERVICES), LTD. AND A. McNISH. Brit. 28492/22 (*Pott. Gaz. and Glass Trade Rev.*, April, 1, 1924). A device for shearing a gob or gather of glass from the metal delivered from a furnace comprises a pair of mechanically operated tongs carrying the shear blades, and means adapted to maintain blades in resilient contact with one another and to have a substantially parallel shearing movement. The device consists of a pair of tongs 5, 6 pivoted to the back end of a cylinder 7, containing a piston 8, the shear blades 9, 10 being clamped to the front ends of the tongs. The tongs are mounted on separate pivots 13, 14 which

are arranged adjacent to one another, and the radius of movement of the blades is such that they come together with a substantially parallel movement. The piston rod 17 is provided with a crosshead 18 having rollers 19 which work in inclined slots 20 on the tongs, so that the stroke of the piston opens and closes the tongs. In order to cause the blades to



maintain their plane of action, during shearing, a metal tongue or plate 21 is pivoted to the tong 6 at 22 and held against it by a spring 26. This plate lies in contact with both tongs, as shown in Fig. 4, and prevents them from getting out of alignment with one another should the blade 9 tend to rise. The blades are adjustably clamped to the tongs by means of bars 29 and bolts 30. The blade 10 may be mounted in a saddle 31 provided with a curved part 34, Fig. 1, which seats in a seating 35 on the end of the tong. The saddle is resiliently held in place by springs 37 and bolts 36, so that slight rocking of the saddle is permitted and the blades are held resiliently in contact. In a modification the crosshead 18 is replaced by a plate with inclined slots that engage rollers on the tongs.

P. D. H.

Heavy Clay Products

Load tests of brick pillars. R. R. SCHLYTER. *Tegel* (Stockholm), 13, 64(1923).—The testing included 2 pillars of ordinary brick in a hollow wall of system "Ottermur," cross-section 80 x 23 cm., height 280 cm., and 3 pillars of concrete and slag concrete, system "Arco," cross-section 120 x 30 cm., height 300 cm. In one test of each kind the load was unsymmetrically applied, the load center being placed 4 cm. away from the center of the cross-section in the direction of the shorter side of the section. In the other tests the load was symmetrically applied. The symmetrically loaded pillars of "Ottermur," tested at an age of 7 months, would yield at a load of 49 kg./sq. cm., figured on the entire cross-section, 62 kg./sq. cm. figured on the effective surface (cross-section minus hollows), 113 metric tons per running m. of wall, 23 cm. thick. The eccentrically loaded pillar yielded at 25 kg./sq. cm. (entire cross-section), 32 kg./sq. cm. (effective surface), 58 tons per running m. The crushing strength of the brick averaged 309 kg./sq. cm., that of the mortar at 28 days' age 5 kg./sq. cm. and at 7 months' age 8 kg./

sq. cm. The pillars of the "Arco" system were tested one month old. The symmetrically loaded pillar built of massive concrete brick in a hollow wall yielded at a load of 41 kg./sq. cm. (entire cross-section), 68 kg./sq. cm. (effective surface), 120 tons per running m. of wall, 30 cm. thick. Expts. were made with a new method for detn. of the crushing strength of brick. 20 half brick were made into 10 cubes by joining two different halves; on these ordinary detns. of crushing strength were made. From the other 20 halves cylindrical cones, 5 cm. in diameter and 5 cm. high, were drilled leaving out the marginal parts of the brick. The results were the following:

| | Crushing strength, kg./sq. cm. | Per cent |
|--|-----------------------------------|----------|
| Av. of 10 cubes | 309 | 100 |
| Av. of weakest cylinder of each cube | 319 | 103 |
| Av. of strongest cylinder of each cube | 471 | 152 |
| Av. of all 20 cylinders | 394 | 128 |
| | | O. A. |

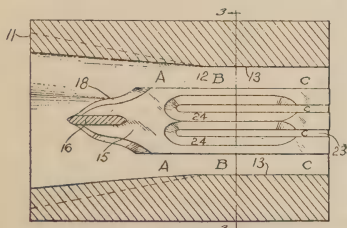
\$10,000 well spent saves many thousands yearly. DEAN W. TAYLOR. *Brick & Clay Rec.*, 65 [1], 31(1924).—The kilns which are down-draft have been equipped for forced draft firing. The air which is furnished by individual blowers at each kiln, driven by $1\frac{1}{2}$ h. p. motors, is delivered to the 10 fireboxes by means of a 12 in. duct encircling the kiln, with 4 in. branches at each firebox. Air under a uniform press. is thus delivered to all parts of the kiln with the foll. advantages: Better control during water-smoking positive circulation in the kiln prevents condensation and its resulting scum; better control during the firing and finishing period; and a reduction of more than 3 days in the firing time. Waste ht. from the kilns was being used for drying and the old installations included four 20 ft. mine fans driven by steam engines. It was found that these fans required $14\frac{1}{2}$ T. of coal per 24 hrs. to oper. Two of the fans at the receiving end of the drier were replaced with a stack and the other 2 were replaced with a 6 ft. multi-blade fan driven by a 40 h. p. motor with a saving of several thousand dollars a year. P. D. H.

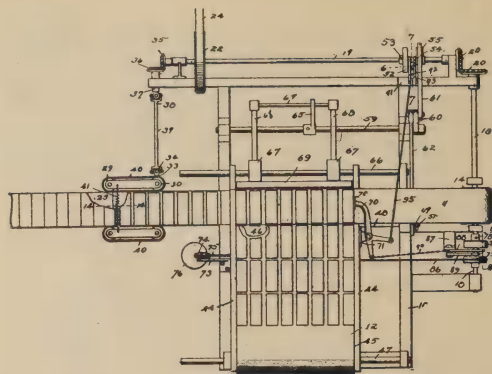
PATENTS

Die for forming hollow blocks. GEORGE W. DENISON. U. S. 1,513,589, Oct. 28, 1924. In a device of the class described, a die having an enlarged receiving end restricted on two sides, and an extruding end substantially rectangular in cross-section, and having cutting means on the receiving end of the die adapted to direct material into the enlarged portions on the sides of the restricted part.



Method of and apparatus for making hollow brick. LEONARD A. DENISON. U. S. 1,513,590, Oct. 28, 1924. The method of forming hollow brick which includes the steps of first forming a hollow column having a webbed cross-section, with intermediate parallel webs extending between two opposite walls of the column, further extruding the column to decrease the thickness of the outer column walls, causing the excess mat. to form bulging masses on said webs and finally forming the bulging masses into transverse webs connecting the first formed webs to each other and to end walls of the column, said steps being effected as the column is continuously extruded. The combination of a die having a converging throat, a core comprising a bridge mounted in the throat of the die and column void forming members mounted on the bridge, said members having cavities formed therein intermediate the core bridge and the die mouth.





Device for handling plastic brick. HALVER R. STRAIGHT. U. S. 1,510,717, Oct. 7, 1924. The combination of a cutter table having a continuously moving column of adjacent plastic brick, a receiving conveyor, arranged longitudinally with said column, means for driving said receiving conveyor at a speed slightly above that of said column, a conveyor at each side of said column, designed to engage the sides of said brick at a point just

ahead of the delivery end of said table, and means for driving said side conveyors at a speed equal to that of the receiving conveyor.

Refractories

On the addition of chromium oxide to silica bricks. STEN SANDLUND. *Jernkontorets annaler* (Sweden), 45-52(1923).—S. has tested a method suggested by Dornhecker (*Stahl u. Eisen*, 1920) for increasing the resist. of silica brick to the corrosive action of FeO bearing slags by adding Cr_2O_3 to the brick. A protecting layer of the highly refrac. chromium spinel, $\text{FeO} \cdot \text{Cr}_2\text{O}_3$, is supposed to be formed at the contact between the brick and the slag. S. produced some hand made silica pots, fired at 1450°C , of the compns. A, B, and C. In these he melted slags of compositions I, II, III, and IV at temps. $1550-1600^\circ\text{C}$. Charges of 10 g. were used. The m. p. was 40 min. The compns. of some of the resulting melts are I-A, I-B, I-C, II-A, II-B, and II-C. Chromium has not been found in any of the melts which shows that Cr_2O_3 does

| | SiO_2 | FeO | Fe_2O_3 | Al_2O_3 | MnO | CaO | MgO | Cr_2O_3 |
|------|----------------|--------------|-------------------------|-------------------------|--------------|--------------|--------------|-------------------------|
| A | 94.71 | ... | 0.82 | 0.58 | Tr. | 1.40 | 0.49 | .. |
| B | 92.27 | ... | 1.25 | 1.53 | Tr. | 1.87 | 0.37 | 2.06 |
| C | 88.90 | ... | 1.30 | 2.64 | Tr. | 1.97 | 0.40 | 4.76 |
| I | 59.68 | 17.36 | .. | 2.34 | 13.39 | 2.81 | 4.10 | .. |
| II | 54.08 | 26.91 | .. | 1.28 | 13.17 | 2.01 | 2.52 | .. |
| III | 44.25 | 34.25 | .. | 2.66 | 13.85 | 3.27 | 2.36 | .. |
| IV | 34.61 | 58.04 | 5.12 | 0.48 | 0.54 | 0.56 | 0.31 | .. |
| I-A | 84.89 | 6.58 | .. | 1.80 | 3.36 | 2.19 | 1.19 | .. |
| I-B | 62.61 | 16.59 | .. | 2.13 | 13.03 | 2.41 | 2.86 | .. |
| I-C | 62.54 | 18.44 | .. | 2.21 | 11.77 | 2.63 | 2.63 | .. |
| II-A | 63.20 | 23.30 | .. | 1.88 | 8.37 | 1.43 | 1.34 | .. |
| II-B | 57.63 | 23.94 | .. | 1.92 | 12.93 | 1.45 | 1.47 | .. |
| II-C | 56.87 | 26.51 | .. | 2.07 | 11.62 | 1.49 | 1.23 | .. |

not react to form a fusible compound. It is seen that an increase of Cr_2O_3 in the silica pots from 2 to 5% has only a small influence on their resist. to corrosion. O. A.

Preparation (in the electric furnace) of artificial sillimanite for refractory uses. C. E. SIMS, HEWITT WILSON AND H. C. FISHER. *Trans. Am. Electrochem. Soc.* **46**, preprint (1924).—Neither indirect- nor direct-arc furnaces seem practical for the melting of Al silicate, because of the low-heat and elec. condy. of this substance. A furnace employing resistance heating, with the electrodes fairly close together and the current flowing through the molten bath, gave the best results. Artificial sillimanite may be

prepd. by melting materials of the proper proportions of Al_2O_3 and SiO_2 or by melting clay and removing the excess SiO_2 by reduction with C. The SiO_2 is removed partly as Si and partly as SiO_2 . Although natural sillimanite has the compn. $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ with an alumina:silica ratio of 63:37, artificial sillimanite always has the compn. $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ with a ratio of 72:28. Artificial sillimanite of an alumina content below the 3:2 compn. crystallizes in long vitreous needles, but that above this ratio is stony and finely crystd. As a refractory, the vitreous material is inferior to the stony. The stony sillimanite brick, which may be called sillimanite-corundum brick, stand a higher load test than silica, spall less than either silica or magnesite, last longer than either silica or magnesite in a high-lime or high-Fe slag, and are as good as silica in an acid slag. When lime as an impurity in sillimanite exceeds 1.5%, it causes a serious reduction in the fusing temp.

D. C. F. (C. A.)

Refractory materials used in the construction of coke ovens. V. BODIN. *Chimie et industrie, Special No.*, 415-29 (May, 1924).—A discussion of the requirements which coke-oven refractories should meet, of lab. tests for estg. these properties, and of the qualities of various classes of materials (silico-aluminous contg. less than 25% Al_2O_3 ; aluminous contg. 30-40% Al_2O_3 ; ultra-aluminous contg. over 40% Al_2O_3 ; bauxite; SiO_2).

A. P.-C. (C. A.)

Refractory linings. W. H. GAYLORD, JR. *Oil & Gas News*, 14, No. 2, 24-8 (1924).—The use of high-temp. cement in place of fire clay in building furnace linings enables the brick to be laid with a very thin joint and the wall bounded throughout its entire thickness at atm. temps. It is desirable to give the entire inner surface of the brickwork a coating of this cement which prevents attack of the brick by flame and hot gases. Details of furnace construction and reconstruction and the use of insulating brick are discussed.

D. F. B. (C. A.)

BOOK

Refractory materials, fire clays, analyses and physical tests. F. R. ENNOS AND A. SCOTT. 28, Special Reports of the Mineral Resources of Great Britain. London: H. M. Stationery Office, 1924. Price 3 s.

H. H. S.

PATENTS

Thoria-crucible production. HENRY KNEELAND RICHARDSON AND THEODORE MACLEAN SWITZ. U. S. 1,512,801, Oct. 21, 1924. As a slip for casting refractory ware a homogeneous mixture of incompletely shrunk thoria, grog, a medium adapted to serve as a colloid, a reagent capable of developing an electrolytic action in the presence of water, in the proportion of 40, 20, 5 and 2 parts, respectively, and water to the desired consistency. The method of making thoria ware, comprising forming a slip of thorium oxide, grog, a double halide salt adapted to serve as a colloid, a reagent capable of developing an electrolytic action in water, and water, subjecting said slip to a vacuum to exhaust any gases therein and casting.

Refractory mortar and cement composition. CHARLES G. CARLSTRUM. U. S. 1,511,503, Oct. 14, 1924. The herein-described composition of refractory materials, for the making of refractory mortars, cements or plasters, consisting of fire clay not more than 20% of the total mass, salt not more than 2% of the total mass, and coal ash not less than 78% of the total mass, substantially as described.

Refractory mortar and cement composition. CHARLES G. CARLSTRUM. U. S. 1,511,504, Oct. 14, 1924. The herein-described composition of refractory materials, for making of refractory mortars, cements or plasters, consisting of fire clay not more than 20% of the total mass, salt not more than 2% of the total mass, coal ash not less than 68% of the total mass and ganister rock not more than 10% of the total mass, substantially as described.

Neutral cement. ROBERT H. YOUNGMAN. U. S. 1,514,812. Nov. 11, 1924. A

refrac. compn. comprising an intimate mixt. of powdered chrome ore and powdered sodium silicate.

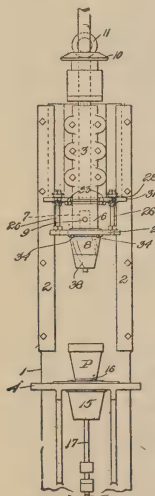
White Wares

New designs for transmission line insulators. E. ALTMANN. *Electro.-Tech. Zeit.*, 1022(1924).—A discussion of some of the faults of porcelain insulators is followed by the explanation of the features of the new designs. These insulators are shown to be sufficiently strong in tension for the service demanded. Elaborate tests were made as to their resistance to stones and bullets. They differ from the conventional design in that they are cement free in assemblage. The insulators are essentially a porcelain bar with expanded ends for attaching hardware, which is attached by a low melting alloy instead of cement. One or more insulating flanges of large diameter may be built into the unit. Units may be connected giving greater insulation value. Tables are appended showing characteristics of new design. J. T. L., JR.

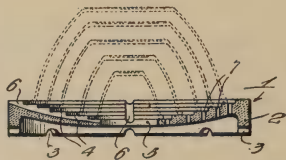
PATENTS

Device and method for forming ceramic objects. ALBERT CHAMPION. U. S. 1,491,079. This is a device for grinding spark plug porcelains. P. D. H.

Pottery trimmer. JOSEPH M. MACCARRAGHER AND ANSELMO GOVONI. U. S. 1,513,840, Nov. 4, 1924. In a pottery molding machine, the combination of a mold having a recess formed at its rim that opens into the cavity of said mold; a core movable into and out of said mold provided with a chine shaping shoulder; and a feather removing member movable into a position within said recess and immediately adjacent the side of the article being molded so that it is in the plane of the joint between said shoulder and the rim of the mold when the core is fully within the latter.



Ware support and process of burning ware. SYDNEY MACKEY. U. S. 1,515,063, Nov. 11, 1924. A support for ware while burning the same, comprising a plurality of sepd. supporting areas surrounding one another and adapted to engage the edges of a plurality of inverted nested receptacles to be burnt.



Equipment and Apparatus

Viscosity determinations in ceramics. ERNST P. BAUER. *Trans. Ger. Ceram. Soc.*, 5, 2(1924).—Describes the patented Fischer-Bauer viscosimeter consisting of a fine gilded copper wire running over a small brass pulley to one end of which is attached a small spherical weight which descends into the container containing the clay slip and to the other end a counterweight slightly lighter whose function is to retard the falling motion and permit closer measurements. The apparatus is adjusted so that the one weight just touches the surface of the slip and the counterweight is then 30 cm. from a stationary marker. The weight is then released and the time measured with a stop watch that it takes the weight to travel down through the slip for a distance of 30 cm. To obtain the true viscosity these results can then be compared with some standard liquid such as glycerine by using the formula $V:V' = ST:S'T'$ where $T + T' =$ the time and $S + S'$ the sp. gr. of the liquids. F. A. W.

New double revolving screen. ANON. *Brick & Clay Rec.*, 65 [1], 54(1924).—The screens revolve in opposite directions. The inner screen is 48 in. in diam. and 9 ft. long. It is divided into 3 sections and runs 16 r. p. m. It acts as a scalper and dis-

tributor. The outer screen is 72 in. in diam. and 9 ft. long. It is divided into 3 sections and runs 10 r. p. m. The normal position for opern. is 20 degrees to the horizontal. It is possible to screen clays higher in moisture content because the finishing screen is vibrated (by hammers) when it is not covered with mat. The screen has a capacity of 4 ordinary 9 ft. dry pans.

P. D. H.

Confine dust in the dry pan. ANON. *Brick & Clay Rec.*, **65** [4], 108(1924).—Much of the dust nuisance resulting from the grinding opern. can be obviated by covering the dry pans with a canvas. A picture is shown of one such effective arrangement.

P. D. H.

Doing away with coal wheelers. ANON. *Brick & Clay Rec.*, **65** [4], 108(1924).—A set of tracks are laid between the rectangular kilns and elevated from 12 to 18 in. above the ground level. These "stub" tracks are placed at right angles to a main line track running between the 2 rows of kilns. The transfer car, on which are set 2 small side dump cars, is drawn by a gasoline locomotive over the main line. The dump cars are rolled by the workman to any desired location.

P. D. H.

New type of viscosimeter. G. GALLO AND M. TENAMI. *Giorn. chim. ind. applicata*, **6**, 280-3(1924); *Jour. Soc. Chem. Ind.*, **43**, B851(1924).—The instrument consists essentially of 2 parallel metal discs which can be rotated about the same geometrical axis a short distance apart. The lower disc is capable of slow uniform rotation, the rate of which is indicated on a speedometer. The rotation of the upper disc is restricted by a spiral spring, the deviation of the disc from its normal position of rest being a measure of the force tending to make it turn. When the chamber contg. the 2 discs is fitted with the liquid to be examd. the rotation of the lower disc causes the upper one to turn to a position dependent on the viscosity of the liquid. If E is the ratio between the respective times of efflux of equal vols. of the liquid and of distd. water at 20°, D the deviation of the upper disc, p the sp. gr. of the liquid, and n the number of revolutions per

minute of the lower disc, $E = \frac{CD}{2pn}$ approx. and $E = \frac{CD}{2pn} + \sqrt{\left(\frac{CD}{2pn}\right)^2 + 0.8632}$ exactly

where C is a constant to be detd. empirically for each instrument.

H. H. S.

The gasoline or electric shovel. H. S. STROUSE. *Brick & Clay Rec.*, **65** [4], 110, (1924).—The half yd. shovel will handle clay enough for from 70,000 to 100,000 brick per day, depending on facilities for switching and handling. A saving of from \$14.00 to \$20.00 per day is effected in the opern. of either a gasoline or elec. shovel in place of a steam shovel. An elec. shovel of $\frac{3}{4}$ yd. capacity will use approx. 10 k. w. hrs. per hr.

P. D. H.

What a poidometer will do. G. C. WEILAND. *Brick & Clay Rec.*, **65** [4], 111 (1924).—The poidometer in conjunction with the liquidometer attachment will feed the clay to the pug mill and temper it with a precision unattainable by a pug mill operator. Even tempering minimizes drier and kiln losses and insures a constant flow of ware. Poidometers can also be used in the fire brick indus. for proportioning mats. to be delivered to the wet pans. They are wired in battery and will automatically stop, should any one fail to receive its supply of mat. The entire unit will automatically resume opern. when the missing mat. is supplied. The capacities vary from 12 T. to 100 T. per hr. The amt. of mat. handled by the mach. in a given unit of time can be readily noted by reading the productimeter.

P. D. H.

Gasoline locomotive spells economy. B. EISENMAN. *Brick & Clay Rec.*, **65** [4], 111(1924).—One small gasoline locomotive will replace from 2 to 6 horses and mules, and a corresponding number of drivers. Locomotives ranging from 1 to 4 T. vary in draw bar pull from 500 to 2000 lbs. On the av. haul over from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile of track, the gasoline consumption of a 1 T. truck power unit will vary from 5 to 7 gals. per day for moving 100 T. of clay.

P. D. H.

A few hints on clay plant hauling equipment. B. F. TOWNSLEY. *Brick & Clay Rec.*, 65 [1], 30(1924).—The particular type of mechanical haulage for a given plant depends on local conditions. Rope haulage should be employed in plants where the pit is located near by and the grade is above $2\frac{1}{2}\%$. If less than $2\frac{1}{2}\%$ other methods may be resorted to with a possible saving. A 1% grade takes almost double the energy that is necessary to move a load on a level track. In general practice, the haulage capacity of a locomotive is 13 T. per ton of locomotive weight, on the level, while with a 1% grade this is reduced to 8 T. and with a 5% grade to 3 T. The gasoline or elec. type of locomotive is generally preferred to steam. The advantages of the former are its low first cost, which is about \$750 per T., its simplicity of opern. and normal fuel consumption cost of about \$1.00 per T. weight per day. This type would accordingly be desirable in plants where requirements are for a less-than-three-ton locomotive. Elec. locomotives propelled by storage batteries offer a reliable, flexible and economical source of power. The first cost per T. weight is about \$1400 and the cost to operate is about 10c per T. per day, and often less as the batteries are charged at night during the off-peak load of the plant. The proper size and type of car is another important factor. Standard practice dictates the use of the V-bottom, steel, side dump cars, where, in many instances, more efficient types could be used. Storage battery trucks are now being used for coal distribution, ash removal and green and fired ware transportation. Portable platforms facilitate the movement of ware. A truck of this type with one man can equal the capacity of from 5 to 10 men with wheelbarrows. P. D. H.

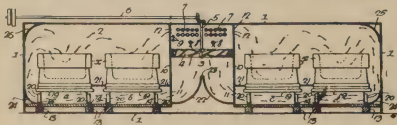
Herbert pendulum hardness tester. C. BENEDICTS AND V. CHRISTIANSEN. *Jour. Soc. Chem. Ind.*, 43, B836(1924).—The Herbert pendulum provides 2 independent tests of hardness, viz., the time test, which gives the indentation hardness and corresponds to the Brinell test, and the scale test, which measures the work hardness or resist. of working with a tool. The ratio of scale of time hardness measures the flow hardness or resist. to flow. The motion of the pendulum ball is shown to be a purely rolling one. The decrease in the time-test number is due to the fact that the softer the metal, the greater is the depth of indentation. H. H. S.

An improved way of washing ocher. A. H. HUBBELL. *Eng. Mining Journal-Press*, 118, 336-8(1924).—A new slime separator, which overcomes the losses in the use of settling tanks for sepg. this non-metallic min., is found valuable. A sepg. tank 14 ft. in diameter receives the mat., the coarse sand settles against a rising stream of water which is adjusted so as to effect the sepn. of sand and slime. The slime, minus 300-mesh, passes over the edge of the cone in the form of a slurry to Dorr thickeners, and thence to agitating tanks and to the sprayer box. From the sprayer box the thickened ocher is passed on to a drum drier, removed, and fed by a screw conveyor to a hammer pulverizer. The coarse sand passes to the bottom of the cone separator and discharges into a cylinder where it is agitated and scrubbed by the flight conveyor. The particles of ocher thus freed are pumped back into the top of the cone. This separator is giving a recovery of 96 to 98% of the ocher. H. G. F.

The thickening and hardening of ceramic pulps. J. MANDRON. *Rev. gén. col-loids*, 2, 41-5(1924).—A description of the Hertenbein continuous rotary filter, with a discussion of its merits in thickening ceramic pulps. A. P.-C. (C. A.)

PATENTS

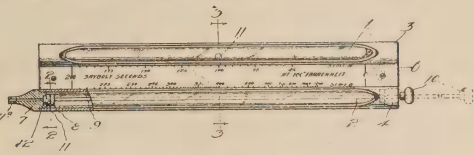
Drier. THOMAS H. RHOADS. U. S. 1,513,932, Nov. 4, 1924. The combination in a drying app. of a casing enclosing two drying chambers and an intermediate circulating, htg. chamber sepd. by vertical partitions having upper and lower passages therein; a series of horizontal circulating fans mounted on vertical shafts, means for driving said shafts; a series of heating coils in the



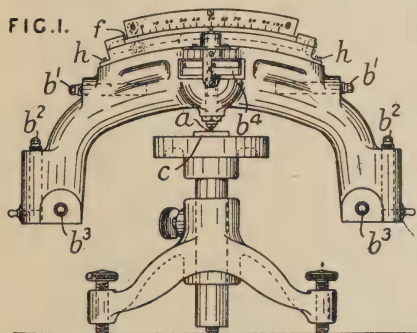
intermediate chamber; means for supplying moisture to the air in circulation, the lower portion of the intermediate chamber being curved so as to direct the air to each of the drying chambers; cars in the drying chambers on which the articles to be dried are mounted, partitions between the cars, the outer ends of the drying chambers being curved; and means for separating the drying chambers and the circulating chamber into independent compartments.

Process of drying hollow articles. ELWOOD B. AYERS. U. S. 1,513,881, Nov. 4, 1924. The process herein described of drying hollow articles having open tops, said process consisting in circulating heated air first under each article and then past the opening therein at a speed sufficient to cause a partial vacuum to be formed within each article to cause a circulation of heated air in the articles.

Viscosimeter. CLIFFORD M. LARSON AND CARL L. KNOPE. U. S. 1,511,998, Nov. 4, 1924. In a device for ascertaining the fluidity of liquids, the combination with parallel tubes, one of said tubes having a liquid of a predetd. fluidity therein, of suction means for drawing the liquid to be tested into the adjacent tubes, means movable with the inclination of the tubes and mounted therein, the relative speed of said movable means through the respective mediums registering the fluidity with the inclination of the tubes.



Method of and means for testing the hardness of metals and other materials. E. G. HERBERT. E. P. 207,876/22. *Jour. Soc. Chem. Ind.*, 43, B320(1924). A test member, *a*, of hard material, *e. g.*, sapphire or hardened steel, weighted by a member formed with a central arched portion and vertical end parts, is caused to roll or oscillate on the surface of the material, *c*, to be tested, adjustably supported on a table carried by an adjustable stand or tripod. Means are provided whereby the center of gravity



of the weight member when in neutral equilibrium may be made to coincide with the center of curvature of the test member, *a*. By rotating the disc, *b^4*, the center of gravity of the instrument may be adjusted above or below the center of curvature of *a* and the length of the equivalent pendulum altered accordingly. In making a test, the center of gravity of the weight member is adjusted to lie below the center of curvature of *a*, and the pendulum tilted from the vertical position until the air bubble of a spirit level, *f*, indicates 0 on the inclinometer scale. When released, the pendulum rolls

along the elongated indentation produced in the test member, and a measure of the comparative hardness of the material under test is obtained by observing the amplitude of the first oscillation of the pendulum after being released. Alternatively the hardnesses of various materials may be compared by determining the times taken for a given number of oscillations of the pendulum when supported on the respective materials. Hardness numbers so determined are convertible into Brinell hardness numbers and extend into regions of hardness where the Brinell test is not applicable.

Kilns, Furnaces, Fuels and Combustion

Lignite as a fuel in the Ceramic Industry. CHR. HEUER. *Feuerungstechn.*, 12 [24], 214(1924).—Lignite, either raw or in the form of briquettes, can be used to ad-

vantage for temps. ranging between 700–1500°C on account of its high gas content which generates a much longer but cooler flame than hard coal. Kiln temps. of 1150° have been reached with the raw lignite and of 1300° with briquettes. Emphasis is laid on (1) combustion chamber must be large on account of high gas content of the fuel and to insure complete combustion, (2) a minimum of poking should be done so as not to break up the briquettes. Long flues under the bottom of the kiln are advisable to utilize the full heat of the long flame. A down-draft kiln measuring inside 39'-6" x 15' x 11' high showed a temperature difference of only 1½ cone between top and bottom. Comp. figures taken from a continuous kiln showed that to fire 1000 brick (79,200 lbs.) 1045 lbs. of raw lignite were required against 330 lbs. of hard coal. Air necessary for combustion was 32% less than with the coal. F. A. W.

A new idea in kiln construction. ANON. *Brick & Clay Rec.*, **65** [5], 173(1924).—P. J. Lengsholz is the inventor of the Lengsholz Improved Brick Kiln. The only change necessary to the av. down-draft kiln is in the bag walls and the addn. of a separate water smoking flue leading to the base of the stack. This flue extends up into the kiln between 2 bag walls and in part of the kiln wall. The side of the flue facing the inside of the kiln is open and the top is arched over. A number of holes approx. 6 in. by 10 in. are built in the front of the bag walls at from 12 to 18 in. above the floor. A cross draft is thus produced which carries the ht. entirely through the ware until it reaches the water smoking flue. By raising and lowering the dampers alternately in the 2 flues the temp. of the kiln is kept uniform from top to bottom during the entire burn. During the water-smoking period, the bag wall openings are kept entirely open after which about ¾ of their area is closed. A fuel saving of from 25 to 50% is said to be accomplished together with a considerable saving of time. A sectional plan and elevation are shown. P. D. H.

Firing brick with city gas. ANON. *Brick & Clay Rec.*, **65** [5], 167(1924).—The use of city gas, at the plant of the Lake View Brick Co., Chicago, Ill., has lowered the firing time from between 68 and 72 hrs. to between 29 and 35 hrs. or better than 50%. The quality of brick around the arches has also been improved. The labor ratio is better than 2 to 1 (approx. 66%) in favor of gas. No statistics are given on comparative fuel costs. A gas compressor boosts the gas press. to 15 lbs. and delivers it to the burners at about 12 lbs. press. A burner of simple pipe construction is used. The gas is turned on slowly until the brick in the vicinity of the arch are through water smoking and then the gas is turned on full until the arch brick attain a "cherry" red color. The gas is then turned down and the ht. permitted to travel upward to a point about 5/8 of the way up, when the gas is turned off entirely. P. D. H.

Protecting the firemen. ANON. *Brick & Clay Rec.*, **65** [4], 108(1924).—The fireboxes on a tunnel kiln were equipped with chain curtains hung from a swinging iron bar or pipe located directly over the firebox. The chains permit the fireman to look into the firebox from close range without discomfort to the eyes. P. D. H.

The insulation of periodic kilns. E. A. PHOENIX. *Brick & Clay Rec.*, **65** [4], 112 (1924).—The advantages of Sil-O-Cel kiln insulation are: Greater fuel economy, improved quality of burn, reduction in firing time and longer life of crowns, walls and fire pockets. For thoroughly insulated kilns, the saving in fuel consumption ranges from 16 to 20%. Insulation of the crown alone results in a saving of from 8 to 10%. Base insulation, in addn. to effecting a considerable fuel saving, is an important factor in increasing the bottom temp. The quality of the ware is improved because of the greater uniformity of ht. distribution. One refrac. plant reduced the percentage of soft brick from 1.2 to 0.25% after insulating crowns and bottoms with Sil-O-Cel brick. Insulated kilns are not susceptible to atmospheric conditions. At one plant, where the bottoms and crowns were insulated, the firing time was reduced from 163 to 135 hrs.

The life of the crowns and walls is prolonged because of the reduction in internal stresses and since the necessity of forcing fires is obviated to a great extent, the life of the fire pockets is also lengthened. The bottoms are usually insulated with either one or two $2\frac{1}{2}$ in. layers of Sil-O-Cel brick or 5 in. of Sil-O-Cel C-3 concrete; the side walls with $4\frac{1}{2}$ in. of either Sil-O-Cel brick or powder; and the crowns, with either one or two $2\frac{1}{2}$ in. layers of Sil-O-Cel brick, laid with Sil-O-Cel mortar and covered with a plating of common brick. Crowns should be waterproofed with Celcote which is a coal tar product especially designed for the purpose. Comparisons in ht. losses between insulated and uninsulated walls and crowns of varying construction are shown in 2 figs. A sectional drawing details the method of insulating round down-draft kilns. P. D. H.

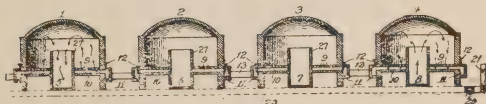
Industrial ceramic furnaces. BRÉMONT. *Chaleur & industrie*, Dec., 1923; *Rev. universelle mines*, 3 [7], 115-6(1924).—A review and discussion of the principles involved in the construction and operation of ceramic furnaces and the most efficient types and of methods for mfg. terra cotta, faience, brick, refractory products, opaque and transparent vitrified products, stoneware and porcelain. C. C. D.(C. A.)

Use of purified gas in the ceramic industry. J. KAVAN. *Chimie et industrie*, Special No., 222-3(May, 1924).—Coal contg. 35.12% H_2O and 15.35% ash was gasified in rotary grate producers, and the gas, cooled to 100° to sep. tar, contained: CO_2 5.5, O 0.4, CO 27.0, H 10.7, CH_4 3.1, N 53.2%, calorific value 1350 cal. per cu. m. at 0° and 760 mm. The gas was used for heating intermittent porcelain kilns, with heat exchanger, and gave a temp. of $1370-1400^\circ$, with an efficiency of about 70%.

A. P.-C. (C. A.)

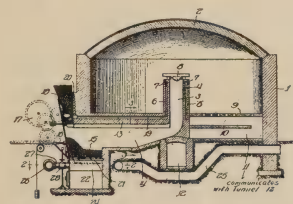
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Kiln. WILLIAM E. WILSON. U. S. 1,513,778, Nov. 4, 1924. In a structure of the character described, a kiln having a plurality of ducts beneath the floor thereof, exhaust means connected therewith, means for controlling the connection between the ducts and the exhaust means, and a perforated floor adapted to permit heated air and gases to be drawn therethrough into the said ducts, the said floor being formed of a plurality of layers, the first of which comprises elongated members, laid transverse to the ducts, and with elongated spaces therebetween, and the second of which is laid transverse to the first.

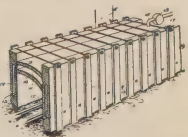


Kiln construction. ENOCH P. STEVENS. U. S. 1,511,535, Oct. 14, 1924. A kiln, comprising an upstanding flue providing a chamber for the passage of gases and a space surrounding said chamber for the passage of air, said flue being provided with means for directing said gases horizontally and means for directing said air at an angle inclined to the vertical.

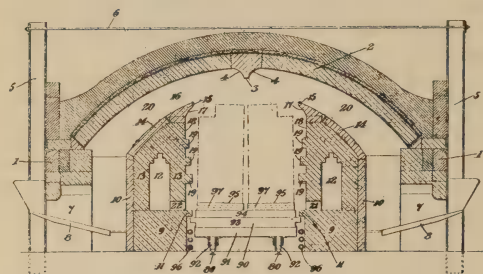
Tunnel kiln. JOHN B. OWENS. U. S. 1,510,556, Oct. 7, 1924. A tunnel kiln provided with a heat collecting chamber extending lengthwise thereof for substantially the extent of the cooling and burning zones in position to receive heat radiating from that part of the tunnel comprehending the burning and cooling zones, means for admitting outer air into said chamber, and means for inducing draft in said chamber to thereby draw outer air thereinto and to cause the warm air therein to be delivered from said chamber for utilization.



Tunnel kiln. WILLIAM LEE HANLEY, JR. U. S. 1,511,218, Oct. 7, 1924. In a tunnel oven, the combination with a firing chamber having a goods space extending



longitudinally thereof, direct firing furnaces for said chamber, said chamber being provided with discharge passages for said furnaces communicating with said chamber near



the top thereof, and means for deflecting the products of combustion downward centrally of the goods space, receiving flues located on opposite sides of said chamber, and interposing an imperforate wall between the said passages and the goods space, said receiving flues being provided with inlet ports on their inner faces adjacent to the lower portion of the goods space, and means for preventing

the products of combustion discharged from said discharge passage into said chamber from passing downwardly therefrom between the goods and the inner walls of the receiving flues.

Geology

Investigations on Norwegian clays. IV. B. DIETRICHSON. *Norges Geologiske Undersøkelse*, 120, 1-52(1924).—Descriptions of quaternary clay deposits and of brick works situated in North Norway, accompanied by photographs of the works and pits, and sketch maps and profile sections illustrating the geology. O. A.

Mattagami china clay deposits. ANON. *Canadian Chem. & Met.*, 8 [11], 266 (1924).—A deposit of china clay has been discovered along the Mattagami River District of Timiskaming, Ontario. There are frequent outcrops and little overburden. The bottom of the deposit was not reached at 75 ft. A very pure glass sand is associated with the clay. Analyses are:

| | Clay per cent | Sand per cent |
|--------------------------------|------------------|------------------|
| SiO ₂ | 49.40 | 99.1 |
| Al ₂ O ₃ | 35.79 | 0.324 |
| Fe ₂ O ₃ | 0.13 | 0.176 |
| CaO | slight trace | trace |
| MgO | slight trace | trace |
| Loss on ignition | 13.85 | |

The deposit is 30 mi. from the terminus of the T & N O R R. A "tote" road is being cleared. F. G. J.

The composition of thomsonite. S. G. GORDON. *Proc. Acad. Natural Sci. Phila.*, 76, 103-7(1924).—Previous work on the formula of thomsonite is reviewed, and the replaceability of Na by Ca is pointed out; then, disregarding this, the results of 55 analyses are recalcd. to mol. ratios, Na₂O being taken as 1. CaO + Na₂O are plotted against SiO₂ and against H₂O, and the ratio-points found to fall on fairly definite lines. Certain points on these lines are assumed, without reasons being given, to represent end-members of some sort of series. Superior analyses of 3 "thomsonites" [all of which have been shown to be optically distinct from this mineral, however, *C. A.*, 17, 2845] are compared with theoretical values calcd. by the formula $n(\text{CaO} + \text{Na}_2\text{O}).n\text{Al}_2\text{O}_3.2n + \text{SiO}_2.3n - 2\text{H}_2\text{O}$, and good agreement is shown. It is concluded that "the thomsonite series can be interpreted as mixed crystals of the end-members: CaO.Al₂O₃.2SiO₂.3H₂O (calcio-thomsonite) [and] Na₂O.Al₂O₃.3SiO₂.H₂O (natrolite 'with' 1 H₂O)" [should read "less 1 H₂O"]. [The optical demonstration that some of the analyses of so-called thomsonite have been made on mixtures with natrolite is thus confirmed, but no new light is thrown

on the compn. of thomsonite with definite optical-crystallographic properties.—Abstractor.] E. T. W. (C. A.)

Production of alumina from clay and other materials. V. M. GOLDSCHMIDT. *Tids. Kemi Bergvaesen*, **4**, 38(1924).—Polemical. The calcns. of the economy of the clay process given by H. Pedersen (*Ceram. Abs.*, **3** [4], 108) are criticized.

C. H. A. R. (C. A.)

Production of alumina from clay. HAROLD PEDERSEN. *Tids. Kemi Bergvaesen*, **4**, 55-6(1924).—A reply to Goldschmidt (preceding abstract). See also *Ceram. Abs.*, **3** [4], 107.

C. H. A. R. (C. A.)

Chemistry and Physics

Reddish discoloration of opaque tin oxide glazes. R. RIEKE. *Trans. Ger. Ceram. Soc.*, **5**, 2(1924).—The research laboratory of the State Porcelain Works, Berlin, traced the discoloration to a small amt. of chrome salts present in the red lead oxide, the charac. bright red color of which had been preserved by the addn. of organic coloring matter. The quantity present was too small to be revealed by analysis and on investigation it was found that as low as 0.0025% chrome oxide led to a decided discoloration. On this account lead oxide should be closely watched for traces of chrome. Tests also showed that the discoloration developed under oxidizing conditions and disappeared if the glaze was subjected to a reducing atmosphere.

F. A. W.

Chemical fumes. I. Size of particles. H. REMY. *Z. anorg. Chem.*, **138**, 167-79 (1924); *Jour. Soc. Chem. Ind.*, **43**, B867-8(1924).—The Stokes-Cunningham formula was used to calc. the size of drops from the rate at which the fumes sink in air. Owing to the agglomeration of the initial drops to form larger particles, the rate of fall of a newly prepd. fume first increases and then attains a constant value. The radius of moist fumes of ammonium chloride increased from 6.2×10^{-5} to 11.9×10^{-5} cms., and of sulphur trioxide from 5.3×10^{-5} to 12.6×10^{-5} cms.

H. H. S.

Structure of "black diamonds" (carbonado). W. GERLACH. *Z. anorg. Chem.*, **137**, 331-2(1924); *Jour. Soc. Chem. Ind.*, **43**, B868(1924).—X-ray examn. of carbonado indicates that it is a conglomerate of interpenetrating crystals of diamond, the individual crystals being covered with a layer of graphite or amorphous carbon.

H. H. S.

Titration of silver and halogen ions with dyestuff indicators. K. FAJANS AND H. WOLFF. *Z. anorg. Chem.*, **137**, 221-45(1924); *Jour. Soc. Chem. Ind.*, **43**, B851(1924).—For the titration of silver and alkali halides, fluorescein is the most suitable indicator in the case of chlorides, and dibromo-fluorescein or eosin for bromides. The amt. of iodide in a mixt. contg. chloride is detd. by titrating 1 part of the soln. with fluorescein as indicator, and another part with dimethyl-di-iodofluorescein; the first titration giving the sum of the 2 halides, and the second the iodide alone. A correction previously ascertained with known mixt. is applied.

H. H. S.

The Pemberton-Neumann method for the estimation of phosphorus. M. B. RICHARDS AND W. GODDEN. *Jour. Soc. Chem. Ind.*, **43**, 1009(1924).—(Meeting, Soc. Public Analysts, Oct. 1.) Sources of error in this method are: (1) absorpn. of CO_2 by the alkali used to dissolve the ammonium phosphomolybdate ppt., and (2) the use of a wrong factor. Errors due to (1) may be eliminated by boiling with excess of acid before final titration. (2) The authors use the factor 0.001365 instead of Neumann's 0.001268, believing that their ppt. is $(\text{NH}_4)_3\text{PO}_4 \cdot 12 \text{ MoO}_3$. The new factor gives results closely agreeing with those obtained gravimetrically.

H. H. S.

Hydrofluosilicic acid III. Method of titrating and properties. C. A. JACOBSON. *Jour. Phys. Chem.*, **28**, 506-9(1924); *Jour. Soc. Chem. Ind.*, **43**, B827(1924).—Titrate first at 0 with N/1 alkali, adding KCl or NaCl and using methylorange as indicator;

then near b. p. using phenolphthalein as indicator. Hydrofluosilicic acid is non-volatile, and is stable only in aqueous soln. in which it may be concd. to approx. 61%.

H. H. S.

Method of dissolving chromic oxide. T. SABALITSCHKA AND F. BULL. *Z. anal. Chem.*, **64**, 322-5(1924); *Jour. Soc. Chem. Ind.*, **43**, B828(1924).—Fuse with mixt. of 2 parts sodium carbonate and 1 part sodium nitrate.

H. H. S.

Color reactions for zirconium and fluorine. J. H. DEBOER. *Chem. Weekblad*, **21**, 404-5(1924); *Jour. Soc. Chem. Ind.*, **43**, B852(1924).—Zr salts give a reddish violet color with alizarinsulphonic acid which is stable in large excess of HCl, but with further acid changes to orange. The color is completely discharged by addn. of traces of fluoride.

H. H. S.

New methods of volumetric analysis. K. JELLINEK AND W. KÜHN. *Z. anorg. Chem.*, **138**, 81-103; 109-34(1924); *Jour. Soc. Chem. Ind.*, **43**, B853-4(1924).—Methylene blue may be used as indicator in titrating bichromate with thiosulphate, and in all cases where a reducing agent such as sodium sulphide is treated with excess of bichromate and the excess titrated by thiosulphate. Potassium permanganate is a satisfactory indicator for titrating zinc with ferrocyanide, the pink disappearing as soon as the ferrocyanide is in excess. Zinc and manganese in boiling solns. may be titrated with sodium sulphide using phenolphthalein as indicator, but there is a constant error in sulphide excess of 8% in case of zinc, and 6% in case of manganese. Al or Pb in soln. may be titrated with disodium phosphate using methyl red as indicator.

H. H. S.

The determination of the thermal conductivity of technical materials. O. TESCHE. *Z. tech. Physik*, **5**, 233-6(1924).—Methods of measurement and the necessary app. are described, which includes a discussion of the sources of error in measurements of this sort. The following data have been obtained on thermal condy. (cal./cm. degree sec.): India rubber (35%) 0.000549, (50%) 0.000477, (90%) 0.000331; transformer oil 0.000310; gelatin soln. 0.00133; celluloid (unknown mixt.) 0.000514; graphite I (unknown mixt.) 0.0165; graphite II (unknown mixt.) 0.0181.

J. H. P. (C. A.)

The recovery of aluminium from clay. H. SPECKETER. *Z. physik. Chem.*, **110**, 514-20(1924).—Formerly Germany was dependent upon other countries for bauxite from which Al was recovered but the World War forced the development of recovering Al from clay. An av. analysis of the clay used is: SiO₂ 53, Al₂O₃ 39.7, Fe₂O₃ 2.9, TiO₂ 3.6%. Both alkali and acid processes are used. The difficulty with the alkali process is in freeing the Al₂O₃ from SiO₂ and with the acid process freeing the Al₂O₃ from Fe₂O₃ and TiO₂ and in recovering the acid. In the alkali process the clay is treated with CaO and Na₂CO₃ at 1100-1200°. Al₂O₃.2SiO₂ + 4CaO + Na₂CO₃ = Al₂O₃.Na₂O + 2SiO₂ + 4CaO + CO₂. In the acid process the temp. is 700-800°. Either H₂SO₄ or HCl may be used. See also *Ceram. Abs.*, **3** [11], 329(1924).

C. H. K. (C. A.)

The two schools of colloid scientists. PAUL BARY. *Rev. gén. colloïdes*, **1**, 39-45 (1923).—The "physical" theory of colloids considers that all matter in a certain region of dispersity is colloidal. According to this theory colloidal is merely a state of matter. B. prefers the "chem." theory according to which the term "colloid" is reserved for those substances which polymerize readily, swell in certain media, exhibit rather indefinite chem. reactions, are amorphous and "melt" to viscous fluids, and possess a peculiar method of going into soln. in the liquids in which they swell. "Colloids" in this sense may yield true solns. under certain circumstances. E. g., the soaps and many dyestuffs give colloidal solns. in H₂O and true solns. in alc. With a glass with small crystals of a metal the physical theory regards the highly dispersed but cryst. metal as constituting a colloid, whereas the chem. theory considers that it is the amorphous, highly polymerized glass itself which is the colloid. The differences between the 2 theories are not so much matters of fundamental conception as of nomenclature and

point of view. The chem. theory is claimed to be more nearly in line with Graham's views. According to the chem. theory the fact that a substance does not pass through a dialyzing membrane has nothing to do with its colloidality. The difficulty of distinguishing sharply between emulsoids and suspensoids is due largely to the attempt to employ the physical theory. According to the chem. theory the suspensoid or lyophobic colloids are *colloidal suspensions* whereas the sols produced in media in which the substance swells, such as gelatin in water below 35°, are *colloidal solutions*. By mech. means gelatin in water below 35° can be dispersed as very fine particles of gel but this is a colloidal suspension, not a soln. At very high dilns. colloidal solns. tend to become true solns. A *sol*, as the term is now used, may or may not be colloidal according as the dispersed phase is or is not a colloid and according to the nature of the dispersion medium. A colloidal soln. is always formed of particles of a colloidal material which is chemically bound to a part of the medium in which it is dispersed.

F. L. B. (C. A.)

Heat conduction in minerals, rocks, and artificial substances of similar composition. K. SCHULZ. *Fortschr. Mineral. Krist. Petrog.*, 9, 221-411(1924).—A comprehensive review, with a 16-page bibliography including: introduction, historical survey, relative and abs. methods for detg. thermal condy., dependence of heat conduction in solids on such factors as temp., pressure, crystn., etc., and detailed tables, in which published numerical data are assembled.

E. F. H. (C. A.)

BOOK

The theory and application of colloidal behavior. Edited by R. H. BOGUE. Vol. I—Theory; Vol. II—Application. New York, McGraw-Hill Book Co. (1924).

H. H. S.

PATENTS

Production of aluminum-alkali double fluorides technically free from iron. A. L. MOND. *Chem. Fabr. Griesheim-Elektron.* Eng. Pat. 203,708, Sept. 8, 1923. *Jour. Soc. Chem. Ind.*, 43, B869(1924).—Clay and the like are treated with min. acids, and the double fluoride is pptd. from the soln. by adding HF and alkali salts, or alkali fluorides and H₂SO₄ or HCl. The iron is either reduced first to ferrous by H₂S or, if ferric salts are present, the quantities of reagents are adjusted so that a small amt. of Al salt remains in soln.

H. H. S.

Separating zirconium and hafnium. H. WADE. *Naaml. Vennoots. Philips' Gloeilampenfabr.* Eng. Pat. (A) 220,358 and (B) 220,359. May 9, 1923. *Jour. Soc. Chem. Ind.*, 43, B869(1924). (a) Minerals contg. Zr and Hf, such as alvite, are fused with KF.HF, and if impurities such as Ti, Cb, Ta, are present, these are removed by converting the metals into their hydroxides and oxychlorides and treating the latter with HCl and alcohol whereby the impurities enter into soln. Zr and Hf are sepd. by the fractional crystn. of their double fluorides, the Hf being more sol. than the Zr double fluoride. Crystn. may be effected in the presence of HF and an excess of an alkali salt. (b) Hf and Zr are sepd. by the fractional pptn. of their oxides or hydroxides by the addn. to their solns. of bases, or of salts such as sodium acetate or thiosulphate which by hydrolysis or decompn. act as bases. They may also be sepd. by partial soln. of the mixed oxides or hydroxides or by a combination of the 2 processes. Hafnium oxide being more basic than zirconium oxide, the ppt. in the first process contains less Hf, and the soln. in the second process contains more Hf, than the original mixt.

H. H. S.

Method of producing calcium arsenate. SAMUEL S. SADTLER. U. S. 1,513,934, Nov. 4. The method of producing calcium arsenate, which comprises the mixing together of a solution of arsenic acid and lime with a third ingredient capable of forming an organic salt of calcium more sol. than calcium arsenate.

Process of making artificial cryolite. HENRY HOWARD. U. S. 1,511,561, Oct. 14,

1924. In a process in which artificial cryolite is formed by the interaction of aluminum fluoride and sodium fluoride in the presence of an ammonium compd. in an aqueous reaction mixt. the steps comprising supplying aluminum fluoride to the reaction mixt. in insol. form and digesting the artificial cryolite product in a soln. of a sodium salt of a strong acid.

Process of producing alumina, alkali, and dicalcium silicate. ALFRED H. COWLES. U. S. 1,514,657, Nov. 11, 1924. The process of obtaining alumina from its silicates which consists in forming a sintered product contg. two mol. weights of lime to one of silica and less than one mol. weight of alkali metal oxide to one of alumina, leaching the product thus obtained and sepg. the alumina contd. in the leached liquor.

General

Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1923-24. *Jour. Soc. Chem. Ind.*, **43**, 1013-4(1924). H. M. Stationery Office, London 1924. Price 3s.—The expenditure for the year was £515,382 of which £103,187 went to 23 research associations. The British Portland Cement Assn., has carried out valuable scientific work, and the industry is receiving subscriptions to carry on without further state assistance. Special consideration has been given to the Scientific Instruments Research Assn. which is said to have achieved valuable practical results. The committee was not so favorably impressed with the results of the Glass Research Assn. but steps will be considered to provide for research in this industry. The facilities at the disposal of the Fuel Research Board are to be increased to test plant or process for low-temp. carbonization of coal. The Building Research Board has investigated the causes of the setting of cement and plaster of Paris, the production of fire-resisting cement, the strength of asbestos cement roofing, and the econ. firing of kilns. The Stone Preservation Comm. is devising methods of recognizing the nature of decay in a variety of stones subjected to varying conditions, and it is hoped to gain insight into the various causes of decay. Grants to research workers and students amtd. £45,303. In discussing these, the report states that bad style and bad work frequently go hand in hand. The defect is attributed to too early specialization. In the last 2 yrs. of school life, science should not be allowed to exclude the humanities. The Council notes with approval a tendency for chemistry students to take topics with a biological training.

H. H. S.

What the South offers the clay products manufacturer. ANON. *Brick & Clay Rec.*, **65** [4], 98-103(1924).

P. D. H.

A Note on the properties of some alloys of nickel. W. R. BARCLAY. *Jour. Soc. Glass Tech.*, **8** [31], 162(1924).—The outstanding properties of nickel alloys are: great resistance to corrosion, great ductility, strength and toughness, retention of strength at high temps., whiteness of color. Nickel-copper alloys and nickel-chromium alloys are taken up separately and their properties pointed out. General uses of nickel alloys and possible applications are discussed.

J. G. P.

Manganese steel in the clay industry. JAMES I. COPPS. *Brick & Clay Rec.*, **65** [5], 177-81(1924).

P. D. H.

Tests to distinguish metals. ANON. *Brick & Clay Rec.*, **65** [4], 109(1924).—A table is given containing 5 tests for distinguishing between malleable iron, cast steel and cast iron. Manganese steel can be identified readily by the fact that it will not become magnetized and is not attracted by a magnet.

P. D. H.

Alloys resistant to heat and corrosion. J. H. G. MONYPENNY. *Jour. Soc. Glass Tech.*, **8** [31], 150(1924).—The mechanical properties of stainless steel are taken up and comparisons made with ordinary steel. Stainless steels compose a whole series of steels, the relative properties depending upon the carbon content just as in ordinary steels.

Stainless steel responds more readily to tempering than ordinary steel. The results obtained from a tempering experiment with stainless steel and carbon tool steel are given in Brinell hardness numbers. Stainless steel resists tempering up to 500°C, while carbon steel decreases in hardness after 200°C is attained. Stainless steel retains its strength well at 500°C. This mat. is also very resistant to oxidation at fairly high temps. The general engineering uses of stainless steel are taken up, and new types of this mat. are described. Alloys which resist oxidation at very high temps. are discussed and their properties pointed out.

J. G. P.

Chemical engineers. *Jour. Soc. Chem. Ind.*, **43**, 1033(1924).—The program of the joint meeting of the Amer. and Eng. chem. engineers in England next year is provisionally as follows: July 5, arrive at Liverpool; July 6–8, Chester; July 9 and 10, the Lakes; July 11, Glasgow; July 12 and 13, Edinburgh; July 14 and 15, Leeds. Visitors leave on July 18 for America.

H. H. S.

Definition of the term "ceramics." O. BOUDOUARD. *Chimie et industrie, Special No.*, 411–4(May, 1924).—A discussion showing the reasons for the adoption of the definition proposed at the 4th international chem. conference.

A. P.-C. (C. A.)

ANNUAL MEETING AMERICAN CERAMIC SOCIETY

February 16-21

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Compiled by the

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

Art

A new Coptic vase. ANON. *Bull. Metropolitan Museum of Art*, May, 1924.—There has lately been added to the Egyptian collection of the Museum, a large Coptic earthenware vase of unusual artistic and archeological value. The vase is unglazed but richly decorated in horizontal bands. The colors are orange-yellow and black-brown over a white engobe. The decorations represent the life of birds and animals, only one coarsely drawn human figure appearing on the vase. The decorative elements of the vase are partly based on the Egyptian love for the Nile landscape with its innumerable fishes, birds and animals amid lotus and papyrus stems. These subjects were retained by the Christian Egyptians and were employed by the Copts both in textiles and in other arts. In comparing the decoration and the arrangements of motifs on this vase with those of the Coptic paintings one finds a great similarity. The development of Egyptian art in the Roman and Byzantine periods shows two different styles: Hellenistic, from the 1st century A. D. until the end of the 4th century A. D., with naturalistic treatment of the motifs; and Coptic, from about the beginning of the 6th century A. D. until the beginning of the 9th century A. D. where the polychrome decorative appearance of the motifs was the main artistic principle. The Copts neglected the study of the proportion and form of the human figure. Coptic art was influenced by the Persians when Egypt was a Persian Province and later when the Arabs conquered Egypt, it became an important center of Arab art. In the beginning the Arabs were very tolerant of the Copts and Coptic art flourished until the 9th century, when the Arab influence finally changed the character of Coptic art from polychrome-decorative to linear. Naturalistic forms were replaced by conventionalized ones, partly derived from Persia. Many of the details of one vase are of Persian origin and not Egyptian and were taken from Persian textiles popular in Egypt during the Arabic period. The 8th century A. D. marks the end of Coptic art and the beginning of the new Arab style with many Persian elements. The new vase probably belongs to this century.

Microscopic structure of the surfaces of mat glasses. K. HESSE. *Sprech.*, 57, 614(1924).
H. G. S.

Cement, Lime and Plaster

Some facts about Portland cement manufacture. CHARLES WADSWORTH. *Chem. Met. Eng.*, 31, 570-3(1924).—A description of the plant of the Petoskey Portland Cement Co. The wet process is used. Power is furnished by waste heat boilers. Raw mats. are ground in Allis-Chalmers com. peb. mills, with a ball consumption of .35 lbs. per barrel of cement.

M. E. M.

Some requirements in the study of Portland cement. THADDEUS MERRIMAN. *Eng. News Rec.*, 93 [3], 105(1924).—Outlines condition to be studied in developing better tests for cement and classifying different types. Gives characteristics of the ideal cement.

F. G. J.

New lime burning plant of Union Carbide Co. H. L. NOYES. *Eng. News Rec.*, 93 [14], 546(1924).—Describes 3 rotary kilns, 8 ft. diam. 125 ft. long, each discharging into a rotary cooler 5 ft. diam. 50 ft. long, fired with pulverized coal.

F. G. J.

Effect of alkali soils on concrete structures. G. M. WILLIAMS. *Can. Eng.*, 45, 587-8(1924).—Results of investigations in this problem which has vexed the west parts of both Can. and U. S., carried on at the Univ. of Sask. Extended field work definitely fixes the fact that the disintegration is a chem. action, not a phys. disruption and further work will be in the nature of lab. research into the chem. reactions involved. A fund of \$40,000 has been contributed by the Research Council of Canada, the prairie provinces and interested corporations for this purpose. Some of the results are briefly as follows: 1. Rapidity of disintegration varies directly as the sulphate concn. 2.

Concn. of salt in ground water may be extremely variable at points short distances apart. 3. Concrete of high quality is most resist. to action. 4. Drainage precautions help where the alkali conditions are bad. 5. Membrane waterproofing may prevent action for a time at least. 6. Port. cement, as now constituted, is inherently subject to attack by sulphates in the soil and ground water and the final soln. is dependent upon the discovery of some mat. which may be added to Port. cement to make it immune to such action. O. P. R. O.

Cement manufacture (Tasmania). ANON. *Jour. of Indus. and Min. Stand.*, **72**, 639(1924).—At the Railton Cement Works, a scheme, covered by patents, has been devised by E. G. Stone, whereby the waste heat from the rotary kiln, passing through the retorts, is used to extract oil from shale, large deposits of which are available in the vicinity. The process is generally termed that of "destructive distillation." The oil vapors issuing from the shale are drawn from the retorts by means of exhausters through various types of condensers. After all the oil has been so extracted the gas still contains a certain amt. of light spirit, which will again be extracted in scrubbing towers. One of these scrubbing towers will work under vacuum and the other under press. When the light spirit is extracted there still remains a large propn. of what is termed "fixed gas." At the outset S.'s patents cover the use of this gas for assisting to calcine the cement mixture into clinker, which is ult. ground to form cement. As there is not sufficient gas in the amt. of shale to be treated to calcine such cement mixt., the necessary amt. of heat will therefore be built up by using the poorer qualities of oil collected during the special process. O. P. R. O.

Yield of hydrated lime from air-slaked lime and magnesian limes. O. REBUFFAT. *Giorn. Chim. Ind. Appl.*, **6**, 328-30(1924); *Jour. Soc. Chem. Ind.*, **43**, B871(1924).—An app. is described for measg. the yield of lime paste (vol. for a given weight of dry subs.) obtainable from air-slaked lime. The yield is not appreciably diminished by magnesia, even in large propn., but is lowered considerably by small amts. of silica or alumina. H. H. S.

Potash from cement dust. Concentration by elutriation. E. J. FOX AND C. W. WHITTAKER. *Ind. Eng. Chem.*, **16**, 1044-6(1924). H. H. S.

Solubility of Portland cement in weathering agents. H. K. BENSON, J. S. HERRICK AND T. MATSUMOTO. *Ind. Eng. Chem.*, **16**, 1063-6(1924). H. H. S.

PATENTS

Cement or waterproof glue material and process of preparing or manufacturing the same. HENRY L. HASKELL. U. S. 1,516,567, Nov. 25, 1924. The process of prepg. a cement consisting of prepg. a soln. of blood albumin in water in the propn. of about 55% of water to 45% of albumin, thoroughly admixing the same, adding thereto a heavy grade of silicate of soda in the propn. of about 9% by wt. of the dry disodium silicate to the albumin content, and mixing the same until the mass becomes of a homogeneous syrupy consistency.

Iron-containing cements. BRITISH PAT. 222,122, 1924. A cement is made by burning a mixt. contg. iron oxide and calcium carbonate, at a temp. below the m. p. of the mixt., the propns. of the mixt. being more than 2 mols. of calcium carbonate to each mol. of iron oxide, and one mol. of lime for each mol. of alumina, and 2 mols. for each mol. of silica, if these compds. are present. Suitable raw mats. are iron pyrites, cinders, iron ores, ochers, and sludge from alumina foundries. According to an example 160 kilos. of pyrites cinders and 300 kilos. of limestone are mixed wet or dry, and fired in a rotary or other kiln at a temp. of about 1100°C. O. P. R. O.

Low-temperature cement. H. KÜHL. Ger. Pat. 399,446, July 5, 1923. *J. Soc. Chem. Ind.*, **43**, B911(1924).—A mixt. of mats. contg. lime and clay together with a small percentage of fluorspar, the lime content being intermediate between that of Port.

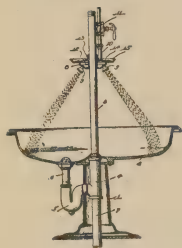
cement and Roman cement, is heated to a temp. slightly above that required to expel CO_2 . The product is said to possess better storage qualities than the corresponding Port. cement.

H. H. S.

Enamel

PATENTS

Enamel composition. HUGH S. COOPER. U. S. 1,517,618, Dec. 2, 1924. An enamel compn. contg. zirconium oxide and an opacifying compd. of a metal having an atomic wt. of about 119, in about the propn. of three wts. to two.



Washbasin. DAVID A. EBINGER. U. S. 1,517,414, Dec. 2, 1924. A device of the class described comprising a basin, a vent pipe rising centrally therefrom, a manifold adjustably carried by the vent pipe and having a soap container associated therewith, and means for introducing water into the manifold.

Glass

River Rouge automobile plate glass factory. J. WILSON ROBINSON. *Eng. News Rec.*, 93 [10], 376(1924).—Lighting and ventilation controlling factors. Annual capacity 10,000,000 sq. ft. automobile glass. Conveyor systems make everything automatic. Four tank furs. built of large fire-clay blocks tied together. Four regenerators on each fur. Outer walls of fur. cooled by air blasts. Temps. 2450°F charging end, 2150°F discharging capacity 250 T. each. F. G. J.

The present position of the glass industry in North America. W. E. S. TURNER. *Jour. Soc. Chem. Ind.*, 43, 1086(1924).—The cut-glass industry has almost died out in America, but colored glass is more and more finding a place. Pot furs. are being displaced by tank furs. which are used even for manuf. of green and blue signal lights, for selenium ruby glass and for elec. light bulbs. There has been a distinct development in the use of blowing machs. or press and blow machs. Reference is made to the Westlake mach. for thin-walled tumblers and the Hartford-Empire mach. for elec. light bulbs. The opern. of sheet glass at the Ford Motor Works is described as epoch-making. Dealing with the problem of fur. efficiency, a table is presented showing for a number of factories the value of the ratio of fuel consumed to glass melted. Several factories could show ratios as low as 0.6. Finally a description is given of heatless leers.

H. H. S.

The production of colorless glass in tank furnaces, with special reference to the use of selenium. IV. The influence of arsenious oxide. A. COUSEN AND W. E. S. TURNER. Meeting of Soc. Glass Tech., The Univ., Leeds, Nov. 19, 1924.—Previous work by the authors had shown the great influence of arsenious oxide in preventing the development of color in a selenium decolorized glass. It was evident that some of the effect was due to the action of the oxide upon the iron present. In confirmation of this fact meltings of a glass batch with addn. of various quantities of arsenious oxide were made, and the color of the glass was found to be less the more of the oxide there was in the batch. This then was the first important effect of arsenious oxide in decolorizing, the second consisted in the suppression of the brown selenium color. From this point of view selenium and cobalt oxide were only secondary mats. in the decolorizing process. The pink color due to selenium was developed at the commencement of melting. For its successful production it required a hot fur. for the first stages of melting, and a low iron oxide content of the glass. An attempt to replace arsenic by its equivalent of phosphorus in the form of calcium phosphate showed the latter substance to have little or no effect upon the brown selenium color. Antimonious oxide used instead of arsenious oxide with selenium gave a deep bluish green color. The cobalt oxide

required in decolorizing was about $\frac{1}{12}$ oz. per 1000 lbs. of sand, and this quantity could not be increased by 50% without producing a distinct blue color in the glass.

A note on some properties of a sandstone block after use in a glass furnace. H. S. HOULDSWORTH. Meeting of Soc. Glass Tech., The Univ., Leeds, Nov. 19, 1924.—In the expts. described refrac. mat. (Penshaw stone) and glass were ground separately until they passed a 100-mesh I. M. M. sieve, and were then thoroughly mixed in the desired propns. A little gelatine soln. was added, and cones were shaped from the mixt. These were then htd. alongside standard Seger cones in a gas-fired lab. fur. The results obtained indicated that powdered Penshaw stone interacted as readily with a soda-lime glass as did powdered or good fire-clay brick. Penshaw stone developed a close compact structure when used in a glass fur. This tended to hinder the penetration of glass into the stone, thus adding to the life of the refrac. and pointing to its successful use in fur. construction.

A striking instance of fire-clay corrosion through the action of saltcake. W. E. S. TURNER. Meeting of Soc. Glass Tech., The Univ., Leeds, Nov. 19, 1924. During the emptying of a glass tank, with the gas flame still running, the fire-clay blocks surrounding the dog-hole in a bottle-glass fur. began to swell and to flow, soon after they became exposed to the action of the flame, as the tank was drained. There was a suspicion that when the tank was started a charge of saltcake had been put into the dog-hole, under the belief that the blocking of the hole would be prevented. After examn. it was found that the exposed portion of the blocks had absorbed saltcake at an early stage in the opern. of the fur. and being covered with glass and the dissociation temp. very high, the saltcake had remained unattacked until contact with the flame during the emptying of the tank brought about decompn.

Note on the glasshouses of the Leeds district in the 17th, 18th, and early 19th centuries. FRANCIS BUCKLEY. Meeting of Soc. Glass Tech., The Univ., Leeds, Nov. 19, 1924.—John Houghton, writing in 1691, stated that there were then 3 glasshouses in Yorkshire, one near Ferrybridge, and 2 near Silkstone. They could now identify these as the glasshouses at Houghton, Bolsterstone and Silkstone. Henry Fenny was in possession of the Glass Houghton factory in 1740, but by the end of the century the business had ceased. The glasshouse at Rothwell Haigh was erected before 1726. A good description of it appeared in the *Daily Post* for March 10, 1726. From the Rothwell Registers it was fairly evident that the firm who took the glasshouse in 1726 included Stourbridge glassmakers. The last actual mention of the glasshouse was in 1773. The only glasshouse actually in or near the town of Leeds in the 18th century was known as the Engine Glasshouse, and this was probably the factory that supplied all the ordinary needs of the town for the greater part of the 18th century. It could be traced between 1738 and 1770. The Engine Glass House might have been the present as well as the predecessor of the famous Hunslet Glass Works, though the connection had still to be proved. Between 1814 and 1861 at any rate, the Bower family had several factories here. The people of Leeds must have owed as much to this family in the 19th century as they did to the Fennys in the previous century. In 1883 they had 4 glasshouses at work, and no competition in the town itself. Just before 1850, however, there was a sudden increase in the glass concerns in Leeds and the surrounding district, especially in the neighborhood of Castleford. An early 19th century glasshouse at Thornhill Lees could be traced back to 1830. Here Noah Turner made flint glass until the glasshouse was taken over by the Kilners before 1847, and converted into a bottle works. There was a glasshouse also at Worsborough Dale in 1833, worked by William Usherwood, but in the following year Messrs. Wood & Perkes were found in possession, making cut glass.

Electrolysis of soda-lime glass. I. Evolution of gas and its relation to sorption

and conductivity. J. W. REBBECK AND J. B. FERGUSON. *J. Am. Chem. Soc.*, **46**, 1991-2002(1924). H. H. S.

Glass industry in Czecho-Slovakia. ANON. *J. Soc. Chem. Ind.*, **43**, 1141(1924).—Conditions continue favorable and exports to America and Gt. Britain remain at a high level, but Belgian competition is being felt. There is a tendency to develop the home industry and to become independent of imports. England re-exports Cz.-S. glass to Canada, S. America and China. The hollow glass trade is now working at 60% pre-war capacity owing to vol. of business with Eng., Japan and U. S. Manuf. of bottles is 50% larger than last year. H. H. S.

Molding and glass sands (Great Britain). DEWEY, BROMEHEAD, CHATWIN AND DINES. *Geol. Surv. Great Brit.*(1924).—The occurrence of easily accessible and large reserves of sand in every way suitable for molding led to the selection of Woolwich as the site of the principal arsenal in Great Britain. This sand varies through shades of gray to pale brown and contains sufficient clay to give it binding properties. The "Erith" or "Blackfoot" molding-sand is sent to all parts of Great Britain and to many foreign countries, and is said to be superior. Chem. anal. gives:

| | Per cent | | Per cent |
|--------------------------------------|----------|------------------------|----------|
| SiO ₂ | 95.21 | MgO..... | Nil |
| Al ₂ O ₃ | 2.43 | K ₂ O..... | 0.89 |
| Fe ₂ O ₃ | 0.42 | Na ₂ O..... | .19 |
| CaO..... | .19 | Loss on ignition.. | .88 |
| | | Total | 100.21 |

The mech. anal. indicates that the grade of "fine sand" is dominant, it contains 95.8% of grains that are greater than 0.1 and less than 1 mm. As to min. compn., the detrital mins. are fairly abundant and occur in angular grains. Ilmenite (altering to leucoxene) and limonite, zircon and rutile abound, and tourmaline, atauroilite, and flakes of muscovite are also found. O. P. R. O.

Notes on the mixing of ingredients for glass. J. VOGEL. *Sprech.*, **57**, 624-6 (1924). H. G. S.

German raw materials for the glass industry. HUGO KÜHL. *Sprech.*, **57**, 622-4 (1924). H. G. S.

Review of the durability of alkali lime glasses. GUSTAV KEPPELER. *Sprech.*, **57**, 617(1924). H. G. S.

Drawing glass tubes by machine. GEHLHOFF. *Sprech.*, **57**, 615(1924). H. G. S.

The physical chemical state of glass. W. EITEL. *Sprech.*, **57**, 614(1924). H. G. S.

Resista glass for laboratory ware. ANON. *Sprech.*, **57**, 457(1924). H. G. S.

Complete automatic glass blowing. WENDLER. *Sprech.*, **57**, 614(1924). H. G. S.

Observations of the elasticity and strength of glass. O. GRAF. *Sprech.*, **57**, 614 (1924). H. G. S.

Construction and operation of a new glass furnace. H. KNOBLAUCH. *Sprech.*, **57**, 614(1924). H. G. S.

Discussion of article entitled "Resista glass for laboratory ware." *Sprech.*, **57**, 627(1924).—This is a discussion of the article published in *Sprech.*, **57**, 457(1924). H. G. S.

The Austrian glass industry of 1923. ANON. *Sprech.*, **57**, 630-1(1924). H. G. S.

Australian glass manufacture, a progressive enterprise. ANON. *Indus. Aust. and Min. Stand.*, **72**, 351(1924).—A description of the Spotswood works of the Aus.

glass manufacturers is illustrated; bottle-making process is described; machines working absolutely automatically perform every operation connected with the production of a first-class bottle. Skilled labor is rapidly being supplanted by the use of machinery, thereby lessening cost and time for production. Glass insulators are also manufactured, and the manufacture of sheet glass is under consideration.

O. P. R. O.

Volumetric glassware regulations. Slight change in units recommended. NAT. PHYS. LAB. *Chem. Age*, 11 (273), Sept. 6(1924).—Substitution of the milliliter for the cc. as the unit of vol. Changes in tolerance, ± 0.06 ml. for a 50 ml. burette Class A as against ± 0.04 cc. heretofore and 0.1 ml. for a 50 ml. graduated pipette Class A as against ± 0.04 cc.

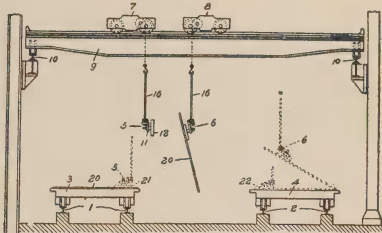
E. J. T.

Standardization of scientific glassware. ANON. *Chem. Age*, 11 (274), Sept. 13 (1924).—Recommendations of the Joint Committee working under the aegis of the Institute of Chemistry, on the question of units of vol. and standards of accuracy.

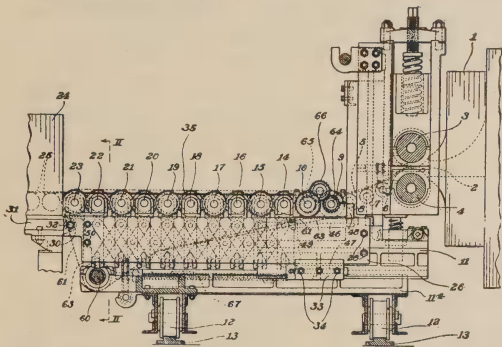
E. J. T.

PATENTS

Process and apparatus for handling glass plates. JOHN H. FOX. U. S. 1,519,248, Dec. 16, 1924. In combination in app. for transferring a glass sheet from one car or carrier to another car or carrier and turning it upside down, which comprises a pair of vacuum lifting frames supported from above so that they may be given a movement of approach and also moved laterally over the tables, and means for raising and lowering the frames, each frame being pivotally supported so that it may face either downwardly or laterally.



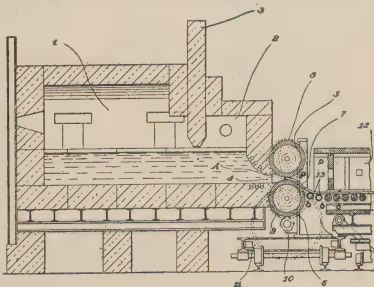
Roller table for glass machines. ALBERT



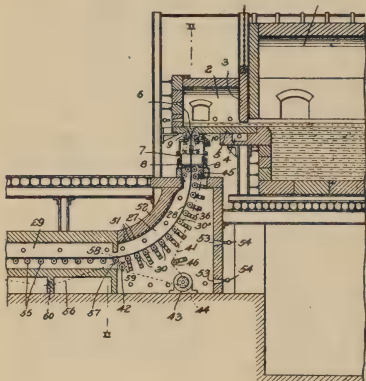
F. EVANS. U. S. 1,519,244, Dec. 16, 1924. The combination with means for continuously forming a ribbon of glass, and a leer in alignment therewith for receiving it, of an intermediate roller table, comprising a plurality of spaced rolls, a slideway extending under the series of rolls at each end, bearing members for the rolls slidably supported on the slideways, means for fixing the end bearing members with respect to the ribbon forming means and leer respectively,

and lazy tong connecting means between the end bearing members and the other bearing members whereby the spacing between the rolls carried by the bearing member is maintained uniform as the end bearing members are moved in and out.

Apparatus for making sheet glass. WALTER G. KOUPAL. U. S. 1,519,314, Dec. 16, 1924. In combination with a tank adapted to carry a bath of molten glass, and having an outlet through one of its walls, and a pair of driven



rolls having reduced end portions with shoulders at the juncture of said reduced portions and the body portions of the rolls, hollow metal closure members at each end



of the rolls fitting between said reduced portions and abutting said shoulders and closing the triangular spaces at the ends of the body portions on the inlet sides of the rolls, and means for supplying a mixt. of gas and air to the interior of said closure members.

Process and apparatus for making sheet glass. HALBERT K. HITCHCOCK. U. S. 1,519,259, Dec. 16, 1924. In app. for forming sheet glass, a glass container adapted to carry a bath of glass therein provided with a refractory bottom with an outlet slot therethrough, a pair of rolls adjacent said slot, means for cooling the rolls, and a curved guideway below the rolls for receiving the sheet formed between the rolls and carrying it laterally, the said guideway being positioned such

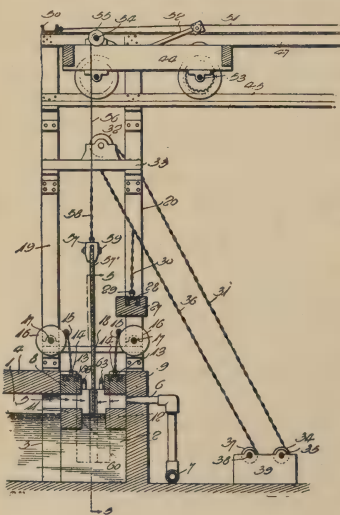
a distance below the rolls that the surface of the sheet may harden beyond the marring point before it reaches said guideway. The process of forming a continuous glass sheet or ribbon which consists in flowing it vertically from a bath of molten glass, passing the sheet through a cooling aperture to reduce it to a uniform thickness, permitting the glass to stretch of its own weight and engaging the sheet after it has hardened beyond the marring point and guiding it laterally into a leer.

Muffle leer. ALVIE C. CRIMMEL. U. S. 1,517,890, Dec. 2, 1924. The combination of a non-metal leer and a plurality of independent removable metallic units serving as muffles therefor and having openings in their opposite portions adapted to serve as either inlet or outlet openings and means for bracing said metal units.



Glass sponge and process of making same. AXEL E. BERTELSON. U. S. 1,515,653, Nov. 18, 1924. A process of making a sponge-like product which comprises mixing

glass wool with a salt which is substantially inert to glass, hgt. sufficiently to sinter the glass, cooling and leaching out the salt. A sponge-like structure composed of a mass of numerous filamentous pieces of glass, sintered together at the points of contact with each other.

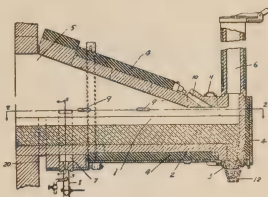


Sheet-glass machine. PRINTISS M. SELLERS. U. S. 1,515,625, Nov. 18, 1924. In a sheet glass making mach., a fire pot including an auxiliary chamber having an open upper end and communicating with the main body of the fire pot above the normal glass level, burner nozzles extending through the outer wall of the auxiliary chamber, supports positioned upon opposite sides of the auxiliary chamber, valve bars resting upon the supports for shutting the nozzle receiving opening of the outer wall and shutting off communication of the auxiliary chamber with the main body of the fire pot above the glass level, a cover bar resting upon the valve bars and closing the space between the same, means for swing-

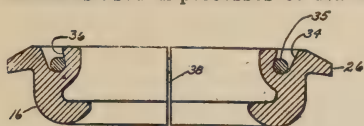
ing the cover and valve bars upwardly to an open position, and means for drawing a sheet of glass out of the auxiliary chamber with the cover bar raised and the valve bars in an operative position, the valve bars when raised admitting ht. upon opposite sides of a sheet of glass to sever the sheet from the body of melted glass in the auxiliary chamber.

Method and apparatus for delivering viscous glass. OLIVER M. TUCKER AND WILLIAM A. REEVES. U. S. 1,516,220, Nov. 18, 1924. A spout for delivering viscous glass from a fur. comprising a trough with a delivery opening therein, an outer lining for said trough, said lining being spaced from the fur. wall to provide a space open to the atmos. between said lining and the fur. wall, and openings through said lining leading into said trough above the level of the glass therein for the introduction of a temp. modifying medium to the spout.

Glass-drawing bait and holder for glass-drawing machines used in processes of drawing glass. HECTOR



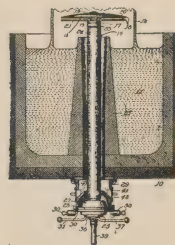
BAZIN. U. S. 1,516,136, Nov. 18, 1924. A combination of a bait for drawing glass, comprising a continuous element, sectionally constructed, and a tension or spring member holding said sections in contact with each other and in contact



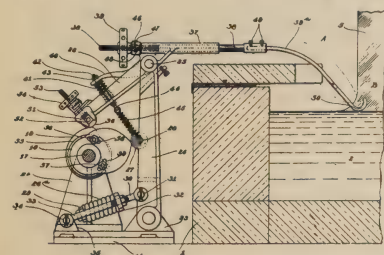
with glass novel. In a glass drawing head, a pivoted lever with a bait supporting surface, and a surface adapted to limit the pivotal motion of the said lever, by contacting with the said drawing head, and a surface adapted to receive a thrust force operg. said lever to a bait supporting position, and a surface adapted to receive a thrust force operg. said lever away from a bait supporting position.

Process in frosting glass and composition to be used therein. CLARKE C. MINTER. U. S. 1,518,807, Dec. 9, 1924. A compn. for forming a substantially colorless translucent frosting upon glass consisting of a water sol. silicate, water, and glass in finely divided particles. A process of frosting glass articles comprising directing a water sol. silicate having suspended thereon finely divided particles of glass across the surface to be frosted, to entirely cover said surface to be frosted with a film of said soln. having disseminated therethrough said particles of glass or the like, exposing said glass article to contact of said film of said solution with the air to cause the formation of a solid film from said soln., and after the formation of said solid film washing said surface with water to remove any water sol. residue.

Art of drawing glass. ROBERT L. FRINK. U. S. 1,518,734, Dec. 9, 1924. The method of producing hollow glass articles which consist in drawing a hollow cylinder from a bath of molten glass and subjecting the walls of said body to an internally exerted substantial kinetic thrust uniformly applied around said walls below the point of congealing or setting thereof, and simultaneously cooling



the same.



Edge holding device for sheet glass. JOHN H. FOX AND JOSEPH H. REDSHAW. U. S. 1,519,247, Dec. 16, 1924. In combination with app. for drawing a glass sheet from a molten bath, a lever arm mounted for swinging movement toward and from the sheet in

a vertical plane, a second lever mounted on the first lever transversely thereof for swinging movement also in a vertical plane, a pair of fingers spaced apart to straddle the edge of the sheet and carried by said second lever, a cam for swinging each lever, a pair of screw adjustments, including threaded stems and hand wheels carried by the second lever, one for moving the fingers toward and from the sheet, and the other for swinging it about its support on the first lever, and means for rotating the cams.

Heavy Clay Products

New asphalt filler for wire-cut brick roads. ANON. *Eng. News Rec.*, 93 [20], 797(1924).—Adoption of wire-cut brick on state roads in Ohio has required a new formula for asphalt filler. This is given. Tests show full penetration of the close joint.

F. G. J.

Should drain tile be porous or vitreous? ANON. *Tonind. Ztg.*, 48, 1115-6(1924).

H. G. S.

Exit the brick yard. H. H. WIKLE. *Chem. Met. Eng.*, 31, 807-8(1924).—The Lake View Brick Co. of Chicago now uses city gas in updraft kilns. No cost figs. are given.

M. E. M.

Vitrified tile liners used in Los Angeles sewers. ANON. *Eng. News Rec.*, 93 [5], 189(1924).—Vitrified tile liners are being used in all main trunk sewers in Los Angeles because it is believed they prolong the life of the sewers. In 50 mi. liners septic condition produces sulphuric acid which attacks concrete. Vitrified pipe is used up to 30 in. diam.

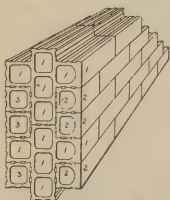
F. G. J.

How can the spirit of craftsmanship be revived in the building industry? E. J. MELUEN. *Eng. News Rec.*, 93 [21], 837(1924).—A plea for good workmanship and a plan of procedure to attain it.

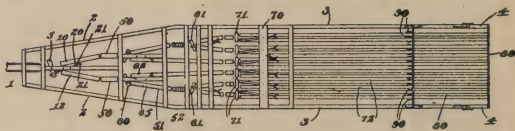
F. G. J.

PATENTS

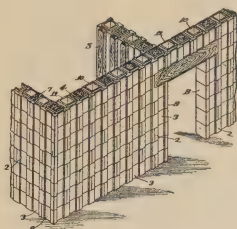
Hollow-tile building block. DAVID R. BONE. U. S. 1,516,491, Nov. 25, 1924. The cruciform building block of which the upright middle part is substantially 3 times as high as its lateral width and is formed with lateral extensions which are horizontally opposite to one another and are substantially equal in height and lateral extent to the lateral width of the said middle part, said middle part extending above the lateral extensions about one-half the distance of its lateral extent, said middle part extending below said lateral extensions about one and one-half times the distance of its lateral extent, substantially as shown, for the purpose specified.



Apparatus for automatically switching brick into plurality of rows for unit formation. ALEXANDER A. SCOTT. U. S. 1,516,409, Nov. 18, 1924. A switching device for controlling the passage of a plurality of brick in successive movement, consisting of means projecting into the path of movement of the brick, and partially displaced therefrom, in combination with additional means moved into the line of travel by a passing brick to complete the switching action of a third brick, whereby the passage of two brick are required to set the switch for disaligning a third brick, in combination with means resetting the switch to its original position by the passage of said third brick.



Interlocking building tile. MORRIS A. DAVIS. U. S. 1,516,473, Nov. 18, 1924. A building block having its longitudinal side faces provided with pockets from top to



bottom, one end of the block being provided with an interlocking rib and the other end with a set to receive a contiguous rib of an adjacent block in a wall course, each of said pockets being capable of receiving said contiguous rib, interlocking, tenon-like beads upon one longitudinal face of the block, and the opposite, longitudinal face having countersunk seats to receive the tenon-like beads of a contiguous block.

Brickmaking machinery. LAURITZ NEILSEN DYHRBERG.

U. S. 1,518,641, Dec. 9, 1924. A brick forming apparatus

including in combination a pugmill, a bar forming die associated therewith, a traveling cutting table for accommodating the bar, a stationary stand between the table and the die and adapted to be partially telescoped by the cutting table, a cutter for acting on the bar on the table, a brick cutting frame mounted on the table, a plunger for acting on the severed portion of the bar on the table for forcing the bar through the frame, a movable delivery table for receiving the cut brick, means for synchronously actuating the cutting and delivery tables and the plunger, and conveying means for receiving the brick from the delivery table.

Brick mold. GEORGE B. MENTZ. U. S. 1,519,150, Dec. 16, 1924. A brick mold of the kind described including, in combination, a base, sides attached thereto, a plurality of relatively thin partitions mortised into both the base and sides whereby the partitions are maintained against side distortion due to pressure, a plurality of outlet openings arranged in balanced relation to the space defined in the base by the sides and partitions, and threaded metallic caps protecting said outlet openings.

Refractories

Guide for choosing refractory material for industrial use. O. A. HOUGEN. *Sprech.*, 57, 627-8(1924).—This is an abstract of an article which appeared in *Chem. & Met. Eng.*, 30, 737(1924). See *Ceram. Abs.*, 3 [8], 246 (1924). H. G. S.

Refractory materials (Great Britain). F. R. ENNOS AND ALEXANDER SCOTT. Special Rep., Mineral Resources of Great Britain. *Geol. Surv.*, 28 (1924).—Refrac. mats., fire clays, analyses and phys. tests. Occurrence and distribution of British fire-clay refrac. are described. Chem. and mineralog. compn. discussed, with changes during firing and the effect of impurities on properties. Methods of analysis employed, and analyses of chem. compn. of fire clays given. Phys. tests on fire clays, methods of testing and results of tests are given. Analyses—refractoriness in relation to chem. compn.; phys. tests—effect of load on refractoriness; firing, relation of porosity and contraction are discussed. O. P. R. O.

Investigation of firebrick for use in gas manufacture. CLAUDE C. BROWN. *Gas Age-Record*, 54, 459(1924).—An investg. of fire brick for the rate of heat absorbed in a certain length of time was reported and tests were made on silica, magnesite, carborundum, clay, and Sil-O-Cel for use in regenerators. Formulas for calcg. the heat absorbed were brought out and the exptl. results checked fairly well. Curves plotted of the results for various thickness of brick and for various brick as to the rate of absorption are given. S. S. C.

Bonding high-temperature refractories. R. C. GOSREAU. *Chem. Met. Eng.*, 31, 696-8(1924).—This article deals with bonding mats. for grain and powder refracs. to be used as patching cements, or in making monolithic linings. A table is given of various refracs., the bonding mats. to be used with them and firing conditions. ✓

M. E. M.

PATENT

Graphite crucible. EDUARD RIETZ. U. S. 1,518,818, Dec. 16, 1924. The described crucible consisting of graphite and compds. of the titanium group of metals.

Terra Cotta

Greek terra cottas. ANON. *Bull. Metropolitan Museum of Art*, May, 1924.—Due to an abundance of good clay in Greece there has always been a great variety of clay objects as well as many vases. Recent acquisitions include a relief, 3 statuettes, 2 heads, a waterspout, 4 vases and a lamp, all interesting pieces and several of unusual merit. In the collection of Tanagra terra cotta statuettes, a nude Aphrodite untying her sandal is a particularly graceful example of a type created in the 4th century B. C. and in favor for a long period. A draped woman in dancing posture, said to be from Trebizond is another attractive piece and it is full of interest for the study of Greek drapery. The Greek feeling for construction and for seeing things as a whole is evident even in this little figure. A group of a teacher with his pupil is an excellent example of the later realistic figures of the 3rd and 2nd centuries B. C. The teacher is entirely absorbed in his task of engraving letters for his little pupil who stands by his side. The figure of the man is beautifully modeled and the whole group is very lifelike. The upper part of a female figure in relief is a piece of beauty and importance, dating from the late archaic period. She is represented as wearing a polos, a chiton, and a sort of cape with openings for the arms; her hands are brought to her breasts, and between the left thumb and forefinger she holds a lotus bud. The piece was pressed in a mold and painted, the white for the flesh and black for the hair are still quite well preserved. The relief was probably a votive object, being hung up in a sanctuary, for in the back there is a hole for suspension. There are a number of similar "masks" as they have been called. One in the Museo Chigi at Sienna is almost identical with this one and there has been much discussion regarding their significance. Apparently they are a survival of the worship of the great nature goddess inherited from Crete and the East, and incorporated in the religion of classical Greece in the person of Demeter. A vase in the form of 3 cockle shells is another beautiful piece and dates from the best period of Athenian vase painting, for the mouth and handles are covered with black glaze of good quality. The shells are very naturalistic with ridgings and markings beautifully rendered and it is well preserved. A similar piece with a different grouping of shells was found at Eleusis and is now in the Museum there. Only the top of it is preserved and this bears the signature of the potter, Phintias. Possibly this one was made by him also. Two heads are interesting products of Greek fictile art at different epochs. One of a woman in the archaic style of the 6th century B. C. with conventionalized hair, protruding eyes and upturned lips, the other a brightly colored head of a man with a wreath and fillet, modeled in the realistic manner of the later Hellenistic art, much closer to nature than the archaic piece but without its remote, serene quality. A waterspout in the form of a lion's head is a good example of a Greek architectural terra cotta, dating probably from 4th century B. C. It is badly battered but enough remains for us to enjoy the fine strong modeling. Three terra cotta vases show the miscellaneous character of Greek ceramics after the 4th century B. C. One is a "Calenian" black-glazed bowl, with a frieze in relief of 4 chariots with victories and divinities, Athena, Herakles, Ares, and Dionysos; perhaps a representation of the apotheosis of Herakles. On the wheel of Dionysos' chariot are the letters L. E., probably the potter's stamp. There are 2 bowls with identical reliefs and 2 are in the British Museum, probably all made from the same mold. Our new one is one of the sharpest impressions. A black glazed plate with stamped, incised and painted decorations of rosettes, wreaths and dots belongs to same ware as table service

found in a tomb at Teano. This new plate is said to have come from Teramo. A buff spindle-shaped vase with inscriptions of white letters on black bands is typical product of the Roman period, as also a lamp with as many as 12 nozzles and a ring handle.

A. A. A.

White Wares

Manufacture of high voltage insulators. M. H. HUNT. *Chem. Met. Eng.*, **31**, 729-32(1924).—A gen. description of the manuf. of high voltage insulators as practised at the Westinghouse Co.'s plant at Emeryville, Calif.

M. E. M.

Beryl. ANON. *Indus. Aus. and Min. Stand.*, **72**, 387(1924).—Opaque beryl, until recently, was considered to possess practically no commercial possibilities, although small amts. have been occasionally used in Ger. for the manuf. of beryllium salts and metallic beryllium, said to alloy with iron, forming beryllium steels, possessing very desirable properties. When beryl is substituted for feldspar in the manuf. of porcelain in amts. varying from 25% to 45% of the total mixts., the other components being silica and clays, a product is obtained which displays a very high electrical resistance and low thermal expansion. This porcelain is therefore considered very promising mat. for electrical uses. Due to scarcity of beryl there has been no commercial production of this type of porcelain.

O. P. R. O.

Feldspar (Victoria). ANON. *Indus. Aus. and Min. Stand.*, **72**, 474(1924).—The recent discovery of feldspar in the north-east dist. of Victoria is of great interest to Australian manufacturers of pottery and porcelain, who have had to import their requirements. Samples show it to be high grade and useful for glaze bodies. Preps. are being made to open up the deposit on a large scale.

O. P. R. O.

Chemical pottery. J. G. ROBERTS. *J. Soc. Chem. Ind.*, **43**, 1156-7(1924).—The greatest difficulty in the commercial production of chemical pottery lies in the varieties of shape and in the comparatively small number of any one type of article required. The methods adopted in manuf. vary according to the size and shape, those of small size and of circular form being produced on the wheel, those of large size being pressed or built-up, while the size of vessels made by casting is limited by the wt. of slip (100 gal. of slip weighs almost a ton), by the difficulty of getting the clay to stand up in the mold after removing the excess of slip, and by the cost of molds. A straight-sided vessel, such as a picnic pot, has been cast up to 80 gal. capacity. Porcelain, composed of quartz, china clay, and feldspar or pegmatite, has sometimes ball clay added to it when large articles are made in order to increase the plasticity and strength of the unfired body. Manufacture is difficult, even when the chem. compn. is known, because of the obscure chem. and phys. reactions which are not allowed to go to completion. Variation of the physical condition of the ingredients leads to disaster. Thus all the α and β transformations of quartz, cristobalite, and tridymite, which take place below the m. p. are accompanied by a change of vol. Clay, again, when calcined to 1000° forms a crystalline sub. not yet identified. No good heat-resisting porcelain contains unchanged quartz but always the needle-shaped crystals which may be $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ or $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$, sillimanite or mullite.

H. H. S.

Equipment and Apparatus

Dry pans for grinding quartzite which discharge automatically. ANON. *Tonind. Ztg.*, **48**, 1116-7(1924).

H. G. S.

How to find the contents of horizontal storage tanks. J. B. REYNOLDS AND S. COTTRELL. *Chem. Met. Eng.*, **31**, 665-7(1924).—The authors derive a formula for detg. the vol. of liquid in a horizontal cylindrical tank with convex ends, in which the radius of the ends equals the diam. of the tank. Two constants are used, and a table of these is given for different heights of liquid. The table is necessary to the use of the formula.

M. E. M.

Are your sieves standardized? L. V. JUDSON. *Chem. Met. Eng.*, **31**, 822-3 (1924).—A plea for care in buying testing screens. Photographs of good and bad screens are shown. M. E. M.

How much does screen testing mean? R. B. LADDO. *Chem. Met. Eng.*, **31**, 623-6 (1924).—The screen test is satisfactory for relatively coarse mat., but of little value for very fine mat. of which a large per cent goes through 300-mesh. Thus, of 2 mat., both of which were 90% through 300-mesh, one might be very much finer than the other. The author recommends photomicrographs of typical fields, using a calibrated net micrometer in the eyepiece, as a means of judging the fineness of extremely fine powders. The fact is noted that naturally disintegrated mats. have a much smaller average grain size than mats. disintegrated by grinding. M. E. M.

BOOKS

The Screening and Grading of Materials. J. E. LISTER. London: E. Benn, Ltd., 1924. Price, 6 s. H. H. S.

Crushing and Grinding Machinery. H. SEYMOUR. London: E. Benn, Ltd., 1924. Price, 6 s. H. H. S.

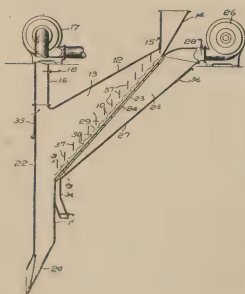
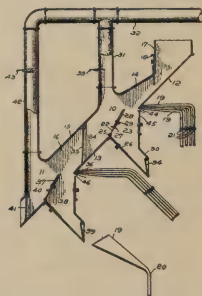
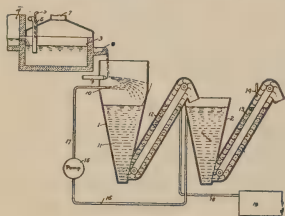
PATENTS

Process for the recovery of metallic values from slag. HARRY V. WELCH. U. S. 1,517,689, Dec. 2, 1924. The process of recovering metallic values from molten metallurgical slag, which consists in bringing said slag, while still molten, in contact with a halidizing agent in an oxidizing atmos. so as to form volatile compds. with a metallic constituent of the slag, collecting the mat. thus volatilized from the slag and subjecting the slag residue to leaching opern. to recover metallic values therefrom.

Pneumatic sizer. ALBERT H. STEBBINS. U. S. 1,517,595, Dec. 2, 1924. In a pneumatic sizer, in combination, a casing provided with separate closed chambers, means for delivering a jet of air into the first chamber, means for delivering a jet of air into the second chamber, partitions within said chambers in spaced relation to the respective jet delivery means, means for delivering mat. to be treated into the path of the jet of air in the first chamber that the lighter mat. may be carried by the air over the partition, means for directing the mat. falling upon one side of said partition into the path of the jet of air in the second chamber to further grade the mat. and means for preventing air from flowing from one chamber to the other.

Pneumatic sizer. ALBERT H. STEBBINS. U. S. 1,517,596, Dec. 2, 1924.* A pneumatic sizer comprising in combination,

a relatively long narrow casing supported at a longitudinal inclination, an apertured surface mounted within the casing and extending diagonally thereof at an increased inclination and forming oppositely flaring air chambers at the opposite sides of said surface, means for delivering the mats. to be treated to the upper end of the apertured surface, means at one end of the inclined casing for delivering air under press. to the under face of the apertured surface, means at the opposite end of the casing for exhausting air from the space above said surface and adapted to draw air from the upper portion of the apertured surface in approximately a horizontal direction, and upstanding baffles within said casing near the

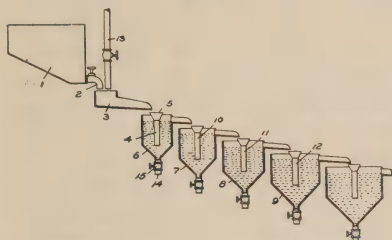
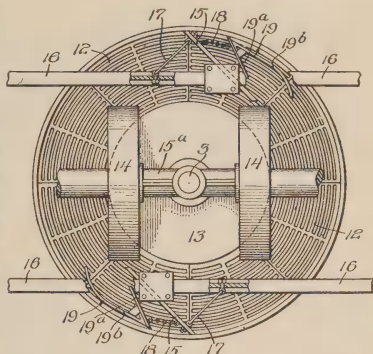


upper face of said surface and arranged to arrest the heavier particles carried laterally by the air.

Grinding mill. THOMAS E. BURNER. U. S. 1,515,654, Nov. 18, 1924. In a grinding mill, the combination with a rotating pan having a wearing surface and a grated bottom, of grinding members coacting with the wearing surface to grind mat., stationary members adapted to push the mat. beneath the grinding members with the rotation of the pan, plow-shaped scraping means floating on the grates, chain hitch connections between the scrapers and the stationary members.

Process for grading abrasives. FREDERICK GELSTHARP. U. S. 1,519,250, Dec. 16, 1924.

The process of grading inorganic abrasives consisting in subjecting a mass of abrasive to a liquid flow in the presence of a deflocculating agent and collecting separate size grades of the abrasive as suspended thereby, the grains of the different grades being of substantially the same compn.



the publication, *Coal and Power*, by the English Liberal Party, on the utilization of refuse mat. for fuel. E. J. T.

A lesson in modern manufacturing. ANON. *Chem. Met. Eng.*, **31**, 767-8(1924).—A description of the new tunnel kiln of the Vitrefrax Co., Los Angeles. The preheating zone is 33 ft. long. The firing zone is 25 ft. long, heated by 7 burners on each side in as many fire-boxes. The fire-boxes reflect heat directly against the ware. The cooling zone is 35 ft. long; the cooling ports are connected by flues to a blower that delivers cold air directly on the ware. Cast iron cars with roller bearing wheels are used. The car bottoms are cooled by a blast of cold air coming through ports in the floor of the tunnel and exhausting through arches built into the foundation of the kiln. Two classes of ware are fired; one which matures at cone 16, the other at cone 26. M. E. M. ✓

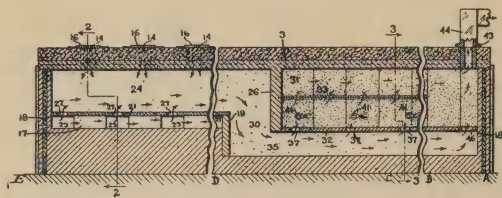
Producer gas as an industrial fuel. D. J. DEMOREST. *Chem. Met. Eng.*, **31**, 578-81(1924).—The opern. of a gas producer, and the theoretical reactions taking place are described. It is only possible to obtain high temps. from such a lean gas, by the use of regenerators. Where a gaseous fuel is needed and there is room for regenerators producer gas is the cheapest fuel available. But whenever the direct burning of coal in any process accomplishes the desired result, producer gas is not economical. Hot, raw gas is better from the standpoint of heat efficiency, but in some operns., and whenever it is necessary to send the gas through mains, it should be cooled and scrubbed. Coal for use in producers should have low ash, high fusion temp. of ash (over 2300), 30-40% vol. mat. and contain very little fines. M. E. M.

PATENT

Tunnel kiln. THURE LARSSON. U. S. 1,517,437, Dec. 2, 1924. A tunnel kiln comprising a foundation and side and top walls forming a kiln chamber for the passage of ware, means for htg. the central zone of the kiln, means providing regulatable air

Kilns, Furnaces, Fuels and Combustion

Coal and power. ANON. *Chem. News*, **129** (3661), Sept. 12(1924).—A discussion of the utilization of



openings from the external atmos. into the interior of the kiln chamber which are spaced longitudinally of the cooling zone for varying the temp. curve thereof, and means for drawing air through said openings into the kiln chamber.

Geology

Potash deposits in Spain. A. MARIN. *Bol. Inst. Geol. España*, **4**, 44; *J. Soc. Chem. Ind.*, **43**, 1109(1924).—The potash basin in Catalonia is 26 miles long by 10 wide, and the potash is found between 600 and 2600 ft. The thickness of the bed is about 13 ft. It is calculated that 268 million tons of K_2O , equiv. to 2000 million tons of potash salts, are present at workable depths.

H. H. S.

The physical chemistry of igneous rock formation. Joint meeting Oct. 22, London, of Faraday Soc., Geol. Soc., and Mineralogical Soc.; *J. Soc. Chem. Ind.*, **43**, 1130–1 (1924).—A general discussion on rock formation. P. NIGGLI in a paper "Homogeneous equilibria in magmatic melts" gave a diagrammatic representation of the formation of rock based on consideration of the homogeneous equilibria in the magma, and connected together a large number of natural phenomena as basis to discuss the laws pertaining to igneous rock. A. F. HALLIMOND's paper "Eutectic and similar structures in silicate melts" dealt with the classification of silicate melts, the interpretation of structures, and suggested a method of investigation by examining polished surfaces under vertical illumination. C. H. DESCH in "The theory of crystallization in rock magmas" said that the best method of study was the detn. of the equilibrium diagrams of binary and ternary systems, combined with a detailed examn. of the effects of cooling for which purpose a knowledge of viscosities of magmas and their variation with temp. and composition is required. J. W. GREGORY in "Magmatic Ores" dealt with gold-quartz veins, chromite, the magmatic iron ores, nickel ores in norite, and the intrusive pyritic massives. J. W. EVANS' paper "Proposed researches on the chemistry and physics of igneous magmas and rocks" dealt with research under uniform or hydraulic press., and the effects of directed press., or shearing stress. W. A. RICHARDSON stated in "Some ultimate problems in petrogenesis" that the science of petrogenesis arose in the recognition of affinities shown by rocks associated in the field, and in such facts as the existence of petrographic provinces and disschistic dykes. He indicated as the chief needs of research: (1) Tabulation of the areas and exposed volumes of visible igneous rocks, so that further estimates of relative volumes could be made; (2) Systematic sampling of rock masses; (3) Investigation on behavior of silicate systems in presence of vapor phases; (4) Temperature gradients and their geographical distribution; (5) The thermal state of the earth, especially the upper crust. W. E. S. TURNER in "Some physical properties of silicate glasses and their possible bearing on the history of igneous rocks" discussed the weathering, corrosion, density, thermal expansion, and compressibility of glasses. G. W. TYRRELL's "Review of recent work on the origin and differentiation of igneous rocks" said that the application of phys.-chem. principles to petrology was hampered by the scarcity of exact experimental high-temp. data. His paper also deals with crystallization-differentiation, influence of water and other volatile constituents in magmatic differentiation, and the origins of anorthosite, alkaline rocks, alnoites, and ultrabasic lamprophyres. Several of the speakers paid tribute to the Geophys. Lab. at Washington.

H. H. S.

Silicic acids. R. SCHWARZ AND E. MENNER. *Berichte*, **57**, 1477–81(1924); *J. Soc. Chem. Ind.*, **43**, B908(1924).—The desiccation curve at 20°C of granular meta-

silicic acid, prep'd. by the action of 80% H_2SO_4 on cryst. sodium metasilicate at 10° , shows definite breaks at $\text{H}_4\text{Si}_3\text{O}_8$ and $\text{H}_2\text{Si}_2\text{O}_5$. TSCHERMAK had previously named these acids granatic and dutholithic acids. The latter cannot exist at 32°C . If the dehydration is entirely intramolecular, the mol. of metasilicic acid must be at least hexameric.

H. H. S.

New aluminum-silicon alloys. J. D. EDWARDS AND R. S. ARCHER. *Chem. Met. Eng.*, **31**, 504-8(1924).

H. H. S.

Chemistry and Physics

Utilization of potassium rock. A. MESSERSCHMITT. *Giorn. di Chim. ed Appl.*, **6**, 431(1924).—The volcanic rocks are treated under press. of steam at high temp. in an autoclave and the phosphates are placed in a sol. form. Leucite, fonolite and zeolite were used to obtain the phosphate. The resulting rock was treated at a lower temp. with NaNO_3 and a $\text{Na}_2\text{OAl}_2\text{O}_3\text{SiO}_2\text{H}_2\text{O}$ was produced and KNO_3 . The $\text{Na}_2\text{OAl}_2\text{O}_3\text{SiO}_2\text{H}_2\text{O}$ was possible for use in prepg. Al and soda alum. The methods of attack depend upon the nature of the rock, *i. e.*, if it is acid, basic or neutral. S. S. C.

Relations of thermal quality to value of fuel gases. C. F. CARRIER. *Chem. Met. Eng.*, **31**, 656-7(1924).—A theoretical discussion of the burning of gaseous fuels. The author concludes that within the limits of all commercial gases, so far as simple htg. effect is concerned, the B.t.u. standard is an equitable basis for detg. gas value. The gas which can be produced at the lowest cost per B.t.u. will be the most economical gas to use for htg. purposes. M. E. M.

Relationship between magnetism and thermoelements. J. C. THOMPSON. *Chem. News*, **129**, 156(1924).—A formula for the calcn. of electromotive power of a junction depending on magnetic susceptibility and reciprocal of atmos. vol. obtained, where H = electromotive power of a metal at 18°C measured against a subs. having e.m.p. 1.5 microvolts per degree less than Pb, A = atmos. vol. and H = magnetic susceptibility.

$$P = \frac{H + 7.52 A}{5.52 A} \text{ when } \frac{H}{A} \text{ is greater than } -2;$$

$$P = \frac{H + 1.63 A}{0.37 A} \text{ when } \frac{H}{A} \text{ is less than } -2.$$

The exptl. and calcd. results on a number of metals were tabulated and values obtained were concordant. S. S. C.

System of LiF and MgF_2 . G. TACCHI. *Gazz. Chim. Ital.*, **54**, 777(1924).—The binary system of LiF and MgF_2 was studied and the eutectic curve produced. The point was found to be at 63.65% MgF_2 , 36.35% LiF by wt., and at 669°C . The LiF used was dehydrated. S. S. C.

BOOKS

Introduction to Theoretical Physics. A. HAAS. Translated from 3rd and 4th editions by T. Verschoyle. London: Constable & Co., 1924. Price, 21s.

Kingzett's Chemical Encyclopedia. Third edition. London: Baillière, Tindall and Cox, 1924. Price, 30s.

Dictionary of Chemical Terms. London: E. Benn, Ltd., 1924. Price, 16s.

The Rare Earths. S. I. LEVY. Second edition. London: E. Arnold & Co., 1924. Price, 18s.

A Comprehensive Treatise on Inorganic and Theoretical Chemistry. J. W. MELLOR. Vol. V. B, Al, Ga, In, Tl, Sc, Ce and Rare Earth Metals, C. (Part I). Pp. x + 1004. London: Longmans, Green & Co., 1924. Price, £3, 3s.

Volumetric analysis. F. SUTTON. Eleventh edition, revised by W. L. Sutton and A. E. Johnson. London: J. & A. Churchill, 1924. Price, 35s.

Publishers of Chemical Books. *J. Soc. Chem. Ind.*, **43**, 1177-82(1924).—An acct. of the more important publishers of chem. books in the English language, beginning with the Oxford University Press founded in 1468. H. H. S.

PATENTS

Powdered sodium silicate and process of preparing the same. WALTER H. DICKERSON. U. S. 1,517,891, Dec. 2, 1924. Sodium silicate in the form of a dry powder composed of globular particles having a hardened glazed surface.

Producing aluminum fluoride-alkali-metal fluoride double compounds practically free from iron. HEINRICH SPECKETER. U. S. 1,517,686, Dec. 2, 1924. Process for producing aluminum-alkali-metal double fluorides practically free from iron, consisting in precipitating under stirring the said double fluorides from aluminum salt solns., containing iron by the addn. in presence of free mineral acid, of substances which on dissolving in water form fluorine ions and alkali-metal ions, the said precipitants being added to such an extent that just a little bit of unchanged aluminum salt is left in soln.

Alumina. New British Pat. No. 5699, 1923. (*Oil and Col. Trade Jour.*, **66**, 1432(1924).)—Alumina, alkali and alkaline earth silicates; double silicates; alkali metal compds., obtaining from complex silicates. Aluminium hydroxide is obtained by heating aluminium silicates such as china clay with alkalis or alkaline earths or their carbonates in presence of water in a closed vessel at 3-4 atmospheres press. or in absence of water to a like temp. Alternatively the silicate is heated with alkalis or alkaline earths or their carbonates in presence of water to a boiling temp. without press. so as to obtain a double silicate, and then this is heated with more alkali or alkaline earth or a carbonate thereof in a closed vessel as described above to obtain alumina and an alkali or alkaline earth silicate. O. P. R. O.

General

Comparison of American and foreign clays as paper fillers. MERLE B. SHAW AND GEORGE W. BICKING. Bur. of Stand., *Tech. Paper No. 262*.—There are approx. from 200,000 to 300,000 T. of clay used annually in the paper industry of the U. S. The larger portion of this is of foreign source. The investg. reported was on relative merits of American and foreign clays. The essential requirements of a paper-making clay are: good color, low content of grit, mica, and other impurities, and uniformity. The paper section of the Bur. of Stand. is equipped for making paper in a semi-commercial way and under practical mill conditions. The exptl. paper-making equipment available for the work on clays consists of a 50-lb. wood tub beater with manganese-bronze bars and plate, a small Jordan with iron bars, a 4-plate screen, and a 29-in. Fourdrinier machine with wire 33 ft. long and having two presses, nine 15-in. driers, a small machine stack of 7 rolls, and a reel. Commercial soda and sulphite pulps, and 8 representative clays, 5 Amer. and 3 foreign, were used in this investg. The comparative study included tests for the amt. of clay retained in the paper, the quality of the paper produced, and those phys. properties of the clay (grit, etc.) that might affect the paper-mfg. processes. Measurements for clay retention included anal. of samples taken at 13 diff. positions on the paper mach. The retention values obtained for the 8 clays (Nos. 1 to 5, domestic; Nos. 6 to 8, foreign) were: using 20% clay, 0.620, 0.611, 0.636, 0.630, 0.633, 0.655, 0.642 and 0.655, resp.; using 30 per cent (runs varying, per cent being made for only 2 clays), clay No. 3, 0.600, clay No. 6, 0.632; using 10%, clay No. 3, 0.720, clay No. 6, 0.748; and using 5%, clay No. 3, 0.744, clay No. 6, 0.740. Similar tests were also made on samples from a commercial mill. The retention data agree with the results obtained in duplicate work in the exptl. mill of the Bureau. The commercial mill test also included a study of white-water losses. Detns. made during the 7 $\frac{1}{4}$ -hr. test period show that, on a 24-hr. basis, without a save-all there would have

been a loss of 3,310 lbs. of clay and 2,369 lbs. of pulp. By using the save-all there would be a loss of only 168 lbs. of clay and 31 lbs. of pulp during that interval. The save-all not only increased stock recovery, by permitting the re-use of water with high concn. of stock for dilution purposes, but also effected a saving of thousands of gals. of water during the 24 hrs. Measurements made on phys. properties of the clays failed to show any correlation between such properties and the amt. of retention in paper, but the color and grit tests slightly favored the foreign clays, although not sufficiently to justify the consideration of only these properties in the selection of clays. Phys. tests made on the finished paper (bursting strength, finish, etc.) showed the results to be independent of the kind of clay added. The complete paper may be purchased from the Supt. of Documents, Govt. Printing Office, Washington, D. C. Price 15c.

H. F. S.

Rules for quarries. ANON. *Quarry and Surveyors' and Contractors' Jour.*, **29**, 314-7(1924).—The Mines Dept. of Gr. Br. working in conjunction with the principal representative bodies of the industry has issued a new code of rules, published as Mines and Quarries—Form 88. The text is given, covering such features of the industry as safety of quarry, use of explosives, means of access, mach. and plant, first aid arrangements, duties of owners and officials and duties of employed.

O. P. R. O.

Requesting a fineness guarantee for lime marls. RUDOLPH BLUNCK. *Tonind. Ztg.*, **48**, 1117(1924).

H. G. S.

Smoke abatement conference. Nov. 4-6, 1924, Manchester, Eng. *Jour. Soc. Chem. Ind.*, **43**, 1088(1924).—Twenty-two papers included: smoke legislation in England and America, diagrams on measg. atmospheric pollution, effect of atmospheric impurities on bldgs., the work of the Departmental Comm. on smoke abatement, and several on boiler design, electricity, and the use of power other than that of coal.

H. H. S.

Fuel Congress at Paris, Oct. 2-3, 1924. *J. Soc. Chem. Ind.*, **43**, 1087(1924).—Rozak showed how Berthelot's method of hydrogenation had made possible the synthesis of hydrocarbons. Kling discussed the production of synthetic paraffin by the Bergius process. Mailhe dealt with the manufacture of motor fuels from vegetable and animal oils. By using magnesium chloride as catalyst, he obtd. 68% of synthetic fuel from the fatty acids of linseed oil. Industrial manuf. presents no difficulty but is only financially feasible with very cheap vegetable oils. Synthetic fuel has also been obtd. from beeswax and chlorophyll, this last suggesting that in time a new branch of the cellulose industry will be established. Goutal, describing the Andry-Bourgeois and Olivier process, stated that starting from water-gas derived from lignite coke, these authors obtd. a synthetic fuel which after hydrogenation gives petrol of d. 0.76 and heat value 11,539 calories per kg. Lumet spoke on the use of vegetable oils as motor fuel; du Boistesselin on the better management of forests for the production of wood charcoal; Auclair on the use of charcoal-gas generators on lorries; Gramme on colloidal fuel; and Guiselin on the catalytic manuf. of synthetic fuels.

H. H. S.

Crushing and grinding. S. G. URE. *J. Soc. Chem. Ind.*, **43**, 1144-52(1924).—The two laws connecting the energy required and the sizes of the mat. before and after subdivision are Rittinger's law and Kick's law. The former assumes that the new surface produced during the process of crushing or grinding is a meas. of the energy consumed in the process. Practical results show that the amount of work done compared with the area of fractured surface is constant for coarse sizes, but the amount of new surface produced in fine grinding is greater than the energy required by the above law. This is attributed to the possibility of incipient fractures during the coarse crushing stage. Rittinger's law is expressed mathematically: $H = C \left(\frac{1}{d_2} - \frac{1}{d_1} \right)$ where

H is power required, C a constant dependent on the mat., and d_1 and d_2 the initial and final diams. or lineal dimensions of the mat. Kick's law states that equal amts. of energy are required for the reduction of equal quants. of mat. through the same reduction range. It is based on the assumption that direct press. of const. amt. per unit is applied to subdivide each particle which breaks up into smaller particles of similar shape. This is written: $H = C \log \frac{d_1}{d_2}$. Neither law is quite accurate, but a satisfac-

tory expression may lie between the two. The various types of machinery are then dealt with, numerous illustrations being given, under the headings: jaw crushers, disc crushers, and gyratory crushers.

H. H. S.

Sir Archibald Geikie, O.M., doyen of British geologists, and a past-president of the Royal Society of London, died at his residence at Haslemere, Eng., on Nov. 10. Born in Edinburgh on Dec. 28, 1835, he was educated at the High School and University of that city, and at the early age of 20 he was appointed to the Geological Survey, to which he was attached until his retirement 46 years later. In 1881 he became Director-General of the Geological Survey of the United Kingdom and Director of the Museum of Practical Geology. In 1871 he was appointed to the newly-founded Murchison Professorship of Geology and Mineralogy in the University of Edinburgh. From the first Geikie was a field geologist, and one of the features of his professorship was the weekly excursion not only around Edinburgh, but often to distant parts of the Highlands. Geikie's sympathies were all with the newer school of geologists who maintained the supreme importance of the ordinary forces of nature in molding the earth's surface, as contrasted with the cataclysmic theories of the older school. He was one of the first geologists to recognize the importance of microscopic investigation as an adjunct to field work. He found time to travel over most of Europe and visited America first in 1878, rambling over hundreds of miles in Canada and Western America. This visit intensified his interest in volcanoes and enabled him to discover and interpret similar evidences of volcanic outbursts in Britain, the results being published in his "Ancient Volcanoes of Great Britain," and "Geological Sketches at Home and Abroad." In 1882 he published the "Textbook of Geology," which is authoritative on this subject. Geikie had a human side to his character. He was a leading spirit of the Royal Society Club, a dining association older than the Royal Society itself, and one of his books is the "Annals of the Royal Society Club." As Romanes lecturer in 1898 he took for his subject "Types of Scenery and Their Influence on Literature." As president of the Classical Assn. he published "The Love of Nature among the Romans," and another work is "Landscape in History." Geikie was knighted in 1891 and received the crowning honor of the Order of Merit in 1914. (*The Times*, London, Nov. 12, 1924.)

H. H. S.

BOOKS

Technical Organization: Its Development and Administration. J. M. WEISS AND C. R. DOWNS. New York: McGraw-Hill, Inc., 1924.

Report on heat insulators. E. GRIFFITHS. *J. Soc. Chem. Ind.*, 43, B983(1924).—Refers to cold-storage. Thermal conductivity values between -15° and 115°C were obtd. for cork, slag wool, charcoal, diatomaceous earth, rubber packings, pitch pine, facing cement, bitumen, concrete blocks, etc. The sp. ht. of five of the materials was detd. by a special calorimeter.

H. H. S.

CERAMIC ABSTRACTS

Compiled by the

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from the editor of *Chemical Abstracts* by cooperative agreement.

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Abrasives

Abrasive manufacture in England. ANON. *Abrasive Ind.*, 5 [11], 275-6 (1924).—This article describes the modern type of automatic abrasive paper coating machine, which has replaced the antiquated hand method, at the plant of W. J. Davies & Sons, Ltd., Bermondsey, London. There are illus. showing the 2 methods. The machinery is of special design, whereas the drying racks on which the coated web is festooned automatically, are the same as those used in the drying of wall paper. An abrasive is described made from a slag produced in making metallic chromium through an endothermic reaction. It runs high in alumina and is considered an excellent abrasive. A mass of crystals is shown. P. D. H.

Outline wheel salvage methods. F. W. BROWN. *Abrasive Ind.*, 5 [12], 293-4 (1924).—The article illustrates and describes the methods followed in salvaging wheels at the plant of the Continental Motors Corp., Muskegon, Mich. The wheels are sided in an engine lathe with mechanical dressing tools at a working speed of 280 r.p.m. on wheels from 12 to 24" in diam. The wheel edges are trued on a heavy grinding stand at a peripheral speed of 2000 ft. per min. on 12 to 24" diam. wheels. From \$1200 to \$1500 worth of salvaged wheels are put back into stock each month. A company having a monthly wheel consumption of \$1000 worth or over should consider a wheel salvage department. P. D. H.

Preparing garnet abrasives. HENRY R. POWER. *Eng. and Min. Jour.-Press*, 118 [14], 532(1924).—The manuf. of garnet abrasives is described. The size of the garnet used is 5-mesh and finer. This is run through rolls which crack it to 20-mesh and finer. Then it is thoroughly graded and the gangue is removed. The next operation is that of accurately sizing over standard screens. Sizes range from 20-mesh down to through 220-mesh. In the coating process, machinery, well known in the textile trade, is used. From a large roll the paper or cloth passes continuously over a roll dipped in a glue solution which coats one side with a thin layer of glue; thence it goes under a hopper containing the graded garnet which falls in a shower on the glued side. To anchor the garnet more securely a second coat of glue is run over it. Uses of garnet paper and cloth have been mostly in the wood working industries. Only the highest quality of material can be used in making surface abrasives. Garnet abrasive paper and cloth are modern abrasive tools of highest quality. A. H. K.

Preparing sands for blasting uses. W. M. WEIGEL. *Abrasive Ind.*, 5 [12], 309-10 (1924). P. D. H.

Manufacture of organic bond wheels. ANON. *Abrasive Ind.*, 5 [12], 316(1924). P. D. H.

PATENT

Abrasive mixture for fitting pistons in cylinders. C. C. BUTTONFIELD. U. S. 1,463,501, July 31. Alundum 27, PbCO_3 32 and graphite 41 parts. U. S. 1,463,502 specifies a mixt. of PbCO_3 with about three times as much SiO_2 , of which 5% is 40 mesh, 5% 60 mesh, 15% 80 mesh, 50% 100 mesh and 25% 200 mesh. A small amt. of graphite also may be added to this mixt. (C. A.)

Art

A note on Greek design—recent accession of pottery. ANON. *Bulletin, Cleveland Museum of Art*, December (1924).—When certain North European tribes came across the mountains into Greece a dozen or more centuries B. C. they brought with them geometric design of lines and spots. In Greece these people found the art of Semetic Cretans, a naturalistic art of representation, combined with ornament of scrolls agreeably filling the space. Others came, forcing the earlier tribes out of Greece to the Islands eastward and to the coast of Asia. These eastward migrants so absorbed the Semetic art that their own reflects it almost totally, while those who remained in Greece absorbed it as an element of new art, reconciling representation with their own instinct for design. Both types of art are shown in the Greek pottery recently acquired by the Museum. A rare Ionic pitcher shows the Eastern Greek playing with Semetic design. The pitcher of the 6th century B. C. is black with a luster like that of the Athenian ware. On one side is a red panel ornamented with a fine cock, lotus flowers filling in the open spaces. The compn. is decorative in the sense of the decoration of Assyrian and Cretan design and has the Semetic characters of arranged naturalism. Three Corinthian pieces of the 6th century B. C., two spherical jars and a drinking cup, are beautiful examples of Greek draftsmanship, mothered by European rhythm and fathered by Semetic imagery, with a beautiful surface pattern like an Oriental embroidery. The charm is in the lovely sensibility of elastic line and moving spot, but no design of the Semetic East can compare with it in utility. The strange animals are drawn with lines of alternate tension and relaxation, in actual rhythm. The rosettes scattered on the field float into every opening space. Such drawing is not a matter of correctness, it is the result of mental images released through the flowing hand of the artist. It is found later in Persian art, in the art of the Renaissance masters of Florence, and of independent origin, in Chinese art. A handsome great amphora (25 $\frac{1}{8}$ " in height) in a style usually called Italo-Corinthian shows that even the Greek provinces in Italy had this Hellenic union of vital representation with elastic design, though the craftsmanship was usually less elegant. Of a light yellowish clay, it is richly colored with reds varying from terra cotta to purplish. Its band of Oriental beasts are drawn with the self-reliant line of the Greek. A 2nd Italian example of Greek works is a bell krater from Apulia, of the 4th century B. C. (12" high). On one side are 2 youths with thyrsus and staff, on the other, a seated Aphrodite with her son Eros holding her girdle; these are of transplanted Athenian Art. A little careless in execution, like most Apulian pottery, it still shows Greek feeling for life expressed in moving line. An Athenian column krater, is of the excellent red-figured ware of the 5th century B. C. On one side is a panel of 3 youths standing in conversation; on the other, 2 satyrs are pursuing 2 maenads. The painting is not careful; but its freedom from discipline helps one to feel the essential character of Athenian drawing. It is a character of form that was felt whether or not it was known, a form expressed always in moving, dynamic line, perfectly free within the confines of its panel. That quality more than any other is the essential of the Hellenic art which has been such a source of strength to the later art of both Europe and Asia. A. A. A.

Ceramic color notes in our Colonial homes. R. T. H. H. *Bull. Metropolitan Museum of Arts*, July, pp. 173-8(1924).—Our early inventories and newspaper advertisements evidence the fact that that same recognition of the decorative value of pottery and porcelain which Lord Macaulay, in his "History of England," attributed to the advent of William and Mary, existed here from our early days along with the appreciation of beautiful textiles, furniture and plate. There is no question but that wooden dishes furnished as a rule our 17th-century New England dining tables. There was also a certain amount of pewter and silver in the homes of the well-to-do and inventories of the period indicate that the white, and blue and white faience made in Holland and England was used in our extreme Northern colonies. In New York, however, there is everything to indicate that many of those K'ang-hsi porcelains brought into Holland by the Dutch East India Company were re-exported here and made important color notes in the rooms of many an early New York home. Some inventories indicated that the holding of a hundred pieces of pottery and porcelain was not uncommon. In New England there were early oriental porcelains also. As the 18th century advanced, and the interest in the potter's art greatly increased in England, quantities of crude earthenware of Staffordshire found a market on this side of the water. Advertisements appeared in the Boston papers and about 1723 came beautiful white salt-glazed ware "tea setts" of white, "blew" and Japann'd glass with also all sorts of white, brown and "blew" stone and fine earthenware, as well as all sorts of Dutch, stone and delf ware. Color was commencing to play an important part. In the second half of the 18th century, salt glazed wares, both white and enameled, came into New York, as well as English brown china tea-pots, flint-ware and earthenware from Bristol. An advertisement (New York 1771) included copper-plated Queen's ware, plain Queen's ware, white stoneware, colly-flower ware, tortoise shell and agate ware and delf ware. While most of the "table setts" so frequently advertised were from the Orient, we have every evidence that the fine English porcelain, tea and dinner sets made at Worcester, Derby, Bow, etc., came over in large quantities. The Museum is most fortunate in possessing a fine collection of English porcelains, the bequest of John L. Cadwalader. "Burnt china," a term used in American inventories to differentiate between porcelain and earthenware, appeared among the offerings of our pottery importers from 1765 on, as well as "a great variety of images for mantle pieces and chests of drawers" (1765), "complete sets of image china" (1767), "burnt image china" (1770), "The greatest variety of ornamental china, sets of figures, pairs and jars" (1770), "A great variety of the neatest ornamental china ever imported, consisting of small cups, figures, pairs, setts, groups, beeckers and jars" (1771). Such documentary evidence and the knowledge of the existence of a few heirlooms from Colonial days warrant the Museum in using examples of these superb English porcelains on tables, chests, mantelpieces, and wall brackets in the "Marmion" and "Powell" rooms, both of which were built toward the end of the Colonial era. Of the various pieces of white stoneware that it is proposed to display in the American wing, the "Porto-Bello" ware must necessarily have the greatest interest to Americans in the intimate relation of the story it tells, to the naming of Mount Vernon, memorializing as it does the capture of Porto Bello, the great Spanish stronghold on the Isthmus of Panama. No victory of the English Arms from the defeat of the Spanish Armada to the achievements of Nelson awakened in England the enthusiasm caused by this event. The idea of making this Porto Bello ware is ascribed to Astbury; it was advertised here for sale as late as 1765. The shapely and quaintly modeled embossments on the bowl illustrated, depict the semi-circular harbor defended by the lofty castles, Gloria and St. Jeronimo, a land battery on a promontory in the harbor beyond which the Spanish gunboats are in hiding. The six ships under sail are shown as well as the figure of the hero. On the other side is the legend:

"The British Glory Revivéd
By Admiral Vernon. He Took
Porto Bello With Six Ships Only
Nov ye 22, 1739.

A. A. A.

Properties of cements intermediate in composition between Portland cement and fused cement. OSCAR HUET. *Rev. Mat. Constr. Trav. Pub.*, **181**, 253-6; **182**, 288-91 (1924).—In Fig. 3 are indicated the 30 compns. including Port. cement on the left and

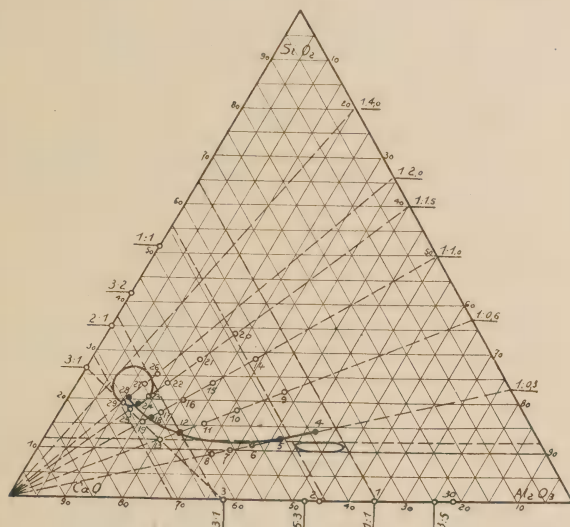


FIG. 3.

fused cement on the right that were made and studied. The raw mats. consisted of marble, sand and hydrated alumina with chem. compns. as follows:

| | Marble | Sand | Hydrated alumina |
|-------------------------------|--------|--------|------------------|
| SiO ₂ | 2.53% | 98.83% | 0.24% |
| R ₂ O ₃ | 0.95 | 1.40 | 66.00 |
| CaO | 52.05 | .... | .... |
| MgO | 1.77 | .... | .... |
| Ign. loss | 42.46 | .... | 33.52 |
| | 99.76 | 100.23 | 99.76 |

The fusions were made in an elec. fur. with a carbon tube resistor and container, and were allowed to cool slowly with the fur. Thin sections for microscopic examn. were made of nearly all compns. The fur. products were also pulverized and subjected to tests for time of set, constancy of vol. by boiling in water, and tensile strength. *Optical study.* 23 photomicrographs are given to illustrate the cryst. structures studied. The cryst. compns. identified in the petrographic study are indicated as (+) in Table I, whereas the cryst. compns. required to be present under equil. conditions according to the work of RANKIN on the ternary system, are marked with or without parentheses,

Short general descriptions of the cryst. compds. found in the products are given in connection with the photomicrographs. *Physical properties.* The test pieces made of a 1:3 mortar were subjected to moist air for the first 24 hrs. and then submerged under water until tested. Table II gives the results. *Conclusions.* In Table II the compns. are divided into 6 groups. The individual compns. giving the highest tensile strength in each group II-VI after 28 days, are joined together, as indicated in Fig. 3. The curve shows not only the compns. between Port. cement and fused cement having the greatest strength but also indicates the limit of constancy of vol. in the field investigated. The curve passing from right to left approaches more and more the line joining $3\text{CaO} \cdot \text{SiO}_2$ and $3\text{CaO} \cdot \text{Al}_2\text{O}_3$. It is also the graphical expression of the increase of the mol. ratios of bases to acids for the compns. having the highest lime content as well as the

TABLE I

| Number | CaO Al ₂ O ₃ | 5CaO 3Al ₂ O ₃ | CaO | 3CaO Al ₂ O ₃ | $\frac{2\text{CaO}}{\text{SiO}_2}$ Al ₂ O ₃ | 2CaO SiO ₂ | 3CaO SiO ₂ | Al ₂ O ₃ | $\frac{3\text{CaO}}{5\text{Al}_2\text{O}_3}$ |
|--------|---------------------------------------|---|-----|--|--|--------------------------|--------------------------|--------------------------------|--|
| 1 | (+) | | | | | | | | |
| 2 | (+) | (+) | | | | | | | |
| 3 | | | | (+) | | | | | |
| 4 | (+) | | | | (+) | | | | |
| 6 | (+) | (+) | | | | (+) | | | |
| 7 | | + | | + | | + | | | |
| 8 | | | | (+) | | + | (+) | | |
| 9 | | | | | (+) | | | | |
| 11 | | + | | + | | + | | | |
| 12 | | | | (+) | | + | (+) | | |
| 13 | | | (+) | (+) | | | (+) | | |
| 16 | | + | | + | | (+) | | | |
| 17 | | | | + | | (+) | (+) | | |
| 18 | | | (+) | (+) | | | (+) | | |
| 19 | | | (+) | (+) | | | (+) | | |
| 22 | | + | | + | | (+) | | | |
| 24 | | | | (+) | | + | (+) | | |
| 25 | | | (+) | (+) | | | (+) | | |
| 26 | | + | | + | | (+) | | | |
| 27 | | | | (+) | | (+) | (+) | | |
| 29 | | | (+) | (+) | | | (+) | | |
| 30 | | | | | | | | + | (+) |

property of constancy of vol., for each of the groups in Table II. Further this degree of basicity increases with the silica index, from group to group. *Rapidity of setting.* The setting of any aluminate contg. less lime than in the compd. $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ is accelerated by the presence of hydrated lime obtained from the simultaneous hydration of silicates of lime in the cement. The aluminates during their hydration set free hydrated alumina, which combines with the hydrated lime to form hydrated tricalcium aluminate, causing the rapid setting of the cement. The aluminates giving the latter effect are $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ and $\text{CaO} \cdot \text{Al}_2\text{O}_3$. The theory is confirmed by the manner of hydration of Nos. 6, 7, 11, 16 and 22 which have the most rapid setting of all compns. From these considerations one might be led to believe that a fused cement having the constitutional formula proposed by BIED $x(2\text{CaO} \cdot \text{SiO}_2) + y(\text{Al}_2\text{O}_3 \cdot \text{CaO})$, would be necessarily quick setting. As a matter of fact the fused cements set normally, the reason being that the aluminates in the compn. predominate to the extent of $y > 2x$. While the hydration

TABLE II

| No. | Group | Composition | Mol. ratio bases/acids | SiO ₂ Per cent | R ₂ O ₃ Per cent | CaO Per cent | Silica index | Index of hydrau- licity | Tensile strength, kgs. per sq. cm. | | | Constancy of volume in boiling water |
|-----|-------|---|---------------------------|------------------------------|---|-----------------|-----------------|----------------------------------|---------------------------------------|------------|------------|--|
| | | | | | | | | | 2d. | 7d. | 28d. | |
| 1 | I | Al ₂ O ₃ , CaO | | — | 64.57 | 35.43 | — | 0.55 | 26.5 | 34.0 | 39.5 | Constant |
| 2 | | 2 Al ₂ O ₃ , 3 CaO | | — | 54.85 | 45.14 | — | 0.82 | 37.5 | 44.5 | 44.0 | " |
| 3 | | Al ₂ O ₃ , 3 CaO | | — | 37.80 | 62.20 | — | 1.65 | 7.5 | 6.5 | 6.5 | Swelled up |
| 4 | II | 2 Al ₂ O ₃ , SiO ₂ , 3 CaO | | 13.93 | 47.21 | 38.86 | 0.3 | 0.64 | 11.5 | 16.0 | 23.0 | Constant |
| 5 | | — | | 12.33 | 41.80 | 45.87 | " | 0.85 | 22.5 | 22.0 | 23.0 | " |
| 6 | | — | | 11.06 | 37.50 | 51.43 | " | 1.06 | 29.5 | 19.0 | 19.0 | " |
| 7 | | — | | 10.03 | 34.00 | 55.96 | " | 1.27 | 5.0 | 5.0 | 5.0 | Soft |
| 8 | | — | | 9.17 | 31.10 | 59.72 | " | 1.48 | — | — | — | Poor |
| 9 | III | Al ₂ O ₃ , SiO ₂ , 2 CaO | | 21.95 | 37.21 | 40.83 | 0.6 | 0.69 | — | — | — | Not tested |
| 10 | | — | | 18.23 | 30.90 | 50.86 | " | 1.04 | 8.5 | 12.0 | 16.0 | Constant |
| 11 | | — | | 15.59 | 26.42 | 57.99 | " | 1.38 | 8.0 | 12.0 | 17.0 | " |
| 12 | | — | | 13.62 | 23.08 | 63.30 | " | 1.72 | 8.5 | 12.5 | 19.0 | " |
| 13 | | — | | 12.09 | 20.49 | 67.43 | " | 2.07 | 5.0 | 7.0 | 8.0 | Soft |
| 14 | IV | 3 Al ₂ O ₃ , 5 SiO ₂ , 8 CaO | | 28.53 | 29.01 | 42.45 | 1.0 | 0.75 | — | — | 1.5 | Not tested |
| 15 | | — | | 23.54 | 23.94 | 52.52 | " | 1.11 | 8.5 ¹ | 11.0 | 14.0 | Constant |
| 16 | | — | | 20.03 | 20.37 | 59.60 | " | 1.48 | 10.0 | 12.0 | 16.0 | " |
| 17 | | — | | 17.43 | 17.73 | 64.84 | " | 1.84 | 11.0 | 12.5 | 18.5 | " |
| 18 | | — | | 16.37 | 16.65 | 66.98 | " | 2.03 | 12.5 | 13.5 | 19.5 | " |
| 19 | V | 2 Al ₂ O ₃ , 5 SiO ₂ , 7 CaO | | 15.43 | 15.69 | 68.87 | " | 2.20 | 4.0 | 7.0 | 11.0 | Soft |
| 20 | | — | | 33.56 | 22.75 | 43.69 | 1.5 | 0.77 | — | — | 2.0 | Not tested |
| 21 | | — | | 28.27 | 19.16 | 52.57 | " | 1.11 | — | 1.0 | 15.0 | Soft |
| 22 | | — | | 23.36 | 15.83 | 60.81 | " | 1.55 | 10.0 | 11.5 | 16.0 | Constant |
| 23 | | — | | 20.66 | 14.01 | 65.33 | " | 1.88 | 11.5 | 12.5 | 17.0 | " |
| 24 | VI | — | | 19.18 | 13.01 | 67.80 | " | 2.10 | 16.5 | 17.5 | 20.0 | " |
| 25 | | — | | 17.91 | 12.14 | 69.94 | " | 2.32 | 4.5 | 8.5 | 13.0 | Soft |
| 26 | | 3 Al ₂ O ₃ , 10 SiO ₂ , 26 CaO | | 25.48 | 12.95 | 61.58 | 2.0 | 1.60 | 2.0 | 2.5 | 4.0 | Not tested |
| 27 | I | — | | 23.26 | 11.83 | 64.90 | " | 1.85 | 11.0 | 16.0 | 20.0 | Constant |
| 28 | | — | | 20.59 | 10.46 | 68.94 | " | 2.22 | 13.0 | 18.0 | 22.5 | " |
| 29 | | — | | 19.48 | 9.90 | 70.62 | " | 2.40 | 17.5 | 19.0 | 23.5 | Cracked |
| 30 | 13 d. | 2 Al ₂ O ₃ , CaO | | — | 78.47 | 21.52 | — | 0.27 | Not tested | Not tested | Not tested | Not tested |

takes place thus: $y(\text{Al}_2\text{O}_3 \cdot \text{CaO}) + \text{aq.} = v/3(\text{Al}_2\text{O}_3 \cdot 3\text{CaO aq.}) + 2v/3(\text{Al}_2(\text{OH})_6)$, the hydrated alumina does not obtain rapidly enough, nor in sufficient quantity for, the hydrated lime (from the silicate) to form the hydrated $3\text{CaO} \cdot \text{Al}_2\text{O}_3$, capable of provoking rapid setting. The setting of a fused cement can be increased by supplying the deficient quantity of silicates of lime by the addition of Port. cement. L. N.

Study on Sorel's cement. KİYONOBU KISHIMOTO AND SHOJI UEKI. (The Osaka Indus. Lab.). *Bull.* 5 [2], 26(1924).—The paper relates to the manuf. of Sorel's cement with Manchurian magnesite and crude magnesium chloride. The magnesite, calcined for 8 hrs. at 800°C , contd. MgO 89.2, CaO 3.5, Al_2O_3 and Fe_2O_3 1.45, SiO_2 3.24 and ig. loss 1.45. Dried crude magnesium chloride was composed of MgCl_2 91.1, alkali chlorides 8.1 and CaSO_4 0.5. I. *Temp. of calcining magnesite.* Results of calcining the magnesite, about 3 cm. large, at various temps. are: (1) Magnesite calcined at 600° or 700°C causes contraction in setting, while that calcined at 1000° or 1100°C expands; (2) Tensile strength of the cement after 1 week is greater than that after 4 weeks, when the magnesite has been calcined at 600° or 700°C ; the relation is reversed, when it has been htd. at 800°C or higher; (3) Moreover, the strongest cement is obtained when the mineral is calcined at 800° or 900°C ; (4) Incomplete dissociation of the magnesite causes, sometimes, crumbling of the briquettes. II. *Concentration of magnesium chloride soln.* Expts. with the solns. of 17–34°Bé have given the result that the stronger the soln. the stronger the cement. Generally speaking, an excess of the soln. reduces tensile strength of the cement briquettes. III. *Mixing of quartz sand.* Roughly speaking, tensile strength of the cement-sand mortar is inversely proportional to the content of sand. IV. *Prevention of weathering and sweating.* Weathering or growth of white minute crystals and sweating on the surface of the cement products are due chiefly to the presence of free magnesium chloride. These defects can be prevented by dipping the set products in a soln. of sodium silicate (5–22°Bé), pot. silicate, hydrogen ammonium fluoride or pot. cyanide. S. K.

Action of silica and alumina on calcium sulfate. MILE. GERMAINE MARCHAL. *Compt. rend.*, 177, 1300–2(1923).—The possibility of recovering SO_2 makes it desirable to study quantitatively the substitution of CaSO_4 for CaCO_3 in the manuf. of cements. (a) Pure CaSO_4 and pure SiO_2 (from SiCl_4) and (b) pure CaSO_4 and pure Al_2O_3 were heated in a porcelain tube fur. With *a* the reaction begins at 870° , with *b* at 940 – 50° . Tables are given showing the equil. pressures of the 2 systems at different temps. up to 1280° . Extrapolation indicates that in *a* atm. pressure is reached at 1273° , and in *b* at 1363° . The difference between these 2 temps. is in keeping with the difference between the heats of formation of Ca silicate and Ca aluminate. (C. A.)

PATENTS

Rotary cooler for cement clinkers, etc. P. T. LINDHARD. U. S. 1,503,193, July 29. (C. A.)

Granulating slag. M. MAGUET. U. S. 1,502,793, July 29. A jet of highly heated basic calcareous and sulfurous slag as it issues from a blast furnace is divided into small drops by the action of a low pressure air blast by which the temp. of the slag is initially lowered to about 1300° . The slag thus loses part of its fluidity without solidification and the drops are then introduced directly into H_2O to effect hardening and shattering into a large number of smaller fragments which constitute an artificial pozzuolanic sand suitable for use in the manuf. of *slag cement*. (C. A.)

Magnesian artificial stone. SOC. INTERNATIONALE MARMORIT. Brit. 214,947, April 23, 1923. A material contg. over 42% MgO is calcined at a temp. above 1600° , ground and mixed with powdered quicklime in the proportion of MgO 4.5 and CaO 1 part. A 20–32° Bé. MgCl_2 soln. is then added, fine sand or CaCO_3 and coloring substances are also added and the mass is molded and retained at a temp. above 20° for 48 hrs. (C. A.)

Tiles and similar articles from asbestos and cement. S. S. WILSON. U. S. 1,503,409, July 29. In forming slabs, sheets, tiles and the like from a mixt. of asbestos, cement and H_2O , the mixt. is spread upon a slab of plaster of Paris in order to remove moisture. (C. A.)

Enamels

Enameled watch-dial. SHIZUO SHIMOMURA. *J. Jap. Cer. Assn.*, **32** [375], 93-100 (1924).—I. *Relation between ground-coat and cover-coat frits.* (1) Coeff. of expansion. Cubical coeff. of expansion must be about 300×10^{-7} and 280×10^{-7} for ground-coat and cover-coat frits resp. (2) M. p. The most desirable m. ps. are about 570° and $800^\circ C$ for ground-coat and cover-coat frits resp. II. *Raw materials.* Clay, feldspar, boric acid and borax are not used for cover-coat frit. Arsenious acid is the only opacifier which gives excellent results. III. *Expts. on the frits.* Series 1. No. 1 in the table, prepd. after an excellent Swiss cover-coat enamel gave a transparent glass which could not be opacified by further increases of arsenious acid. Reduction of alkalis made the glass opaque, though it became too refrac. By increasing red lead, light opaque ones were obtained. Then they were improved further by adding more arsenious acid, though it made the enamels too brittle. This defect was overcome by changing the amts. and ratio of the alkalis. Thus a pretty good enamel, No. 11, was obtained.

TABLE I. COVER-COAT ENAMELS

| | Quartzite | Red lead | Arsenious acid | Potassium carbonate | Sodium carbonate | Niter |
|--------|-----------|----------|----------------|---------------------|------------------|-------|
| No. 1 | 100 | 120 | 13 | 36 | 45 | 5 |
| No. 11 | 100 | 170 | 16 | 22 | 3 | 4 |
| No. 14 | 100 | 163 | 17 | 25 | 3 | 4 |
| No. 17 | 100 | 160 | 19 | 24 | 5 | 4 |

Expts. on the ground-coat frits for No. 11 are described. A batch, composed of quartzite 100, red lead 140, feldspar 70, slaked lime 25, antimony oxide 15, sodium carbonate 50 and niter 10, gave a satisfactory result. The use of fluorspar was abandoned, as it caused bubbling. Introduction of boric acid seems to make the enamels too hard. Series 2. Expts. on the further improvements of the enamel No. 11 are described. Increase of potash in the enamel No. 11 at the expense of lead oxide made it more bright and fit for charcoal pressing on account of its softness. *E. g.*, enamel No. 14 is far better than No. 11. Further decrease in lead oxide made the enamel too soft, though better result in the charcoal pressing was obtained. This defect was overcome by replacing some potash with soda. Enamel No. 17 is one of such compounds. A ground-coat frit from quartzite 100, red lead 155, feldspar 70, slaked lime 25, stannic oxide 50 (or stannic acid 25 + arsenious acid 25), sodium carbonate 52 and niter 10 was excellent for use with these cover coats. IV. *Grinding and washing of frits.* Cover-coat frits must be air-cooled and then ground to pass through No. 120 sieve. Then, they are washed with water and nitric acid. They are used as cover-coat enamel as they are. Ground-coat frits may be poured in water, other procedures being similar with above. A ground-coat enamel is made by regrinding a mixt. of a ground-coat frit and a cover-coat enamel, say in equal parts. V. *Firing.* Ground-coat was fired for 4 minutes at $750^\circ C$, while cover-coat was heated for about 15 minutes at $850^\circ C$. S. K.

Principles of enameling. II. H. F. STALEY. *The Ceramist*, **4**, 87-98(1924).—The properties, mixing and prepn., function in enamels, importance of accurate chem. anal., control of feldspar. In dry coat enamels for cast iron, feldspar constitutes 30-35% of the raw enamel mixt., or 36-42 of the melted enamel. In sheet steel enamels 20-60% of feldspar is employed. In wet coat enamels for cast iron from 0-30%

feldspar is used. Excepting in a few ground coats for dry coat cast iron enamels, the feldspar is melted in the frit. The following are the factors by which the percentage amts. in the melted enamel of pure minerals must be multiplied to give the effect on the comparative figs. usually employed for controlling expansion of enamels.

| Mineral (pure) | Coeff. factor for each per cent |
|-----------------|------------------------------------|
| Potash feldspar | 2.87 |
| Soda feldspar | 2.70 |
| Lime feldspar | 3.18 |
| Quartz | 0.80 |

Variation in the rel. amts. of feldspar in any one standard commercial brand does not have a marked effect upon the coeff. of expansion, but comparatively small variation in the amt. of free quartz has a decided effect on the coeff. of expansion. The detn. of free quartz by microscopic examn. of the feldspar is accurate only to about 5% of quartz, which is not sufficiently close for such purposes. The analytical detn. of total silica is not sufficient to show the amt. of free quartz present. The only satisfactory method is a complete and careful chem. anal. The author shows that the increase of silica content above certain minimum decreases the coeff. of expansion uniformly. After a certain silica content is agreed upon the feldspar shipper should maintain the variation of the silica within 0.5% of the agreed figure otherwise chipping or crazing may follow.

C. W. P.

Principles of enameling. III. H. F. STALEY. *The Ceramist*, 4, 167-78(1924).—*Specifications for feldspar.* The author shows by calcn. of free quartz content the nature of the difficulties which may be anticipated with small variations in the silica and the feldspar. The relative influence of potash and soda in enamel is discussed. The author considers it doubtful whether the effect of the kind of alkali present in feldspar has ordinarily any important effect on enamel compn. In purchasing feldspar it would seem advisable to specify the relative amts. of potash and soda with rather wide limits. He doubts whether the amt. of lime present in feldspar has any effect on enamels. Moreover, calcium oxide can be bought at a low price in the form of whiting, therefore in purchasing, the max. amt. of lime permissible should be specified. In general the amt. of magnesium oxide is less than 0.5% excepting in certain feldspar deposits which are not being worked at present. The action of these feldspars should be carefully studied before they are substituted. The max. amt. of magnesium permissible should be specified. The amt. of alumina present in feldspar is fixed by the per cent of potash, soda and lime. Any mat. excess is an indication either of the presence of kaolin or of poor anal. The presence of kaolin may be detd. by a mineralogist. Iron oxide may be present in amts. less than 0.5% which is permissible for feldspar used in making white enamels. It is possible that this limit may be raised to 1%. This, however, should be checked by trial. The amt. of free silica may be calculated from anal. The greatest objection to its variation is the notable effect it has upon fusibility and thermal expansion. Also, free silica can be more cheaply purchased in the form of ground quartz. Free quartz is permissible in the highest grade feldspar in amts. up to 5%. Higher percentages may be present provided the shipments do not vary. The author proposes specif. for several types of feldspars. The cone fusion test, the color on fusion, screen test, moisture content, and influence of fineness of grain are briefly discussed.

C. W. P.

Principles of enameling. IV. H. F. STALEY. *The Ceramist*, 4, 229-36(1924).—Calcn. of percentage compns., of melted enamel by fluorides and for loss of silica assuming that the fluorides are decomposed and that fluorine volatilized as silicon fluoride.

C. W. P.

Principles of enameling. V. HOMER F. STALEY. *The Ceramist*, 4, 351-62 (1924).—A summary of the recent work on fish-scaling as reported by Shaw, Danielson and Souder, Grainer, Sweely and Geisinger. The author reviews and analyzes their results and gives the following summary. (1) Fish-scaling in enamels on sheet metals consists of rupture of the enamel due to compressive stresses. The causes of these compressive stresses may be (a) higher coeff. of thermal expansion and contraction of the metal than of the enamel; (b) uneven cooling of the piece of ware, especially when this produces warping. (2) Whether the stresses operating will cause the enamel to rupture will depend upon the magnitude of the stresses, the form and thickness of the enamel coating, the breaking strength of the enamel, its elasticity, and its adhesion to the metal. (3) Factors effecting the difference in thermal expansion and contraction of the metal and the enamel coating are: (a) Compn. of the enamel batch, (b) degree of mtg. of the batch, (c) amt. and character of raw additions, (d) degree of firing of the enamel coating. (4) Factors effecting uneven cooling and warping are: (a) Thickness of the metal and enamel coating in various parts of the piece, (b) size and shape of the piece, (c) rate of cooling, (d) character of the metal (warping only). (5) Factors effecting the adhesion of the enamel to the metal are: (a) Compn. of the enamel batch, (b) degree of mtg. of the enamel, (c) amt. and character of raw additions, (d) degree of firing of the enamel coating, (e) thickness of the enamel coating. (6) Factors effecting the adhesion of the enamel to the metal are: (a) Compn. of the enamel, (b) method of prepn. and application, (c) degree of firing of enamel coating, (d) structure of metal surface, (e) cleanness of metal surface.
C. W. P.

Principles of enameling. VI. H. F. STALEY. *The Ceramist*, 5, 29-35(1924).—Investigation made by the author on the influence of the size of grain of feldspar leads him to conclude that enamellers cannot use 40-mesh feldspar to advantage, that there is some advantage in using 140-mesh instead of 90-mesh, and that there is no advantage in using 200-mesh. In white enamels containing lead oxide and antimony, the use of coarse grained feldspar lengthens the time of melting to such an extent that blue tints are likely to be developed. The enamel compn. used was a high grade sodium antimonate enamel.
C. W. P.

Principles of enameling. VII. H. F. STALEY. *The Ceramist*, 5, 96-104(1924).—Discussion of the derivation of the factors used in the calcn. of the coeff. of thermal expansion with special reference to recent observations by TURNER and his associates and investigators of the Bureau of Standards. The writer is of the opinion that while the factors possibly are not accurate from the standpoint of highly specialized phys. labs., nevertheless they are satisfactory as a guide in the tech. control of enamel mixts.
C. W. P.

The development of sheet metal for vitreous enameling. JAS. A. AUPPERLE AND HOWARD BROOKS. *The Ceramist*, 4, 294-303(1924).—The production and properties of Armco iron for enamel stock. It has been found desirable to keep the carbon content about 0.01%, manganese below 0.03%. The microstructure of ingot iron, mild steel, wrought iron and welded ingot and mild steel are discussed with particular reference to their use as enamel stock.
C. W. P.

Enameling furnace design. ANON. *Ceram. Indus.*, 4 [1], 30-7(1925).—This article covers the advantages and disadvantages of different types of furs., the fuels used in each and the principles of successful opern. There are a number of sketches showing different types of fur. construction including the new elec. rotary continuous fur. A large amt. of enameling fur. data, resulting from questionnaires, is given in tabular form and discussed.
P. D. H.

Staging a remarkable comeback with new enamel furnaces as a basis. ANON. *Ceram. Ind.*, 3 [6], 381-5(1924).—The remodeled plant of the Wolff Mfg. Corp., of

Chicago, Ill. is described. Eight double and 2 single Carboradiant fur. were built. The details of the fur. are shown and the operation described in drawings. The fuel oil is carried at 50 lbs. press. with air at $1\frac{1}{2}$ lbs. The combustion chambers are made of carborundum. The heat from the waste gases which are by-passed through a vertical tube boiler is utilized to furnish hot water for the entire htg. system of the plant.

P. D. H.

Cabinet sand blast proves popular. ANON. *Ceram. Ind.*, 3 [6], 412(1924).—The Crown Stove Co. of Chicago, Ill., has an 8 ft. humane type, direct press. sand blast cabinet of the Mott type which has a capacity of 47,000 lbs. of castings per month by using 2 men for 26 ten-hour days. The operator directs his work through celluloid panels from the outside and sometimes finds it necessary to wear goggles but never a mask.

P. D. H.

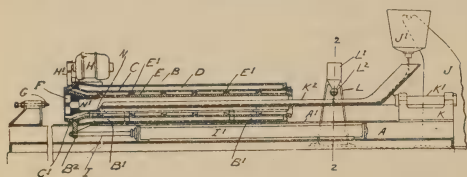
Types of enamel smelters. J. E. HANSEN. *Fuels & Furnaces*, 2, 141-4(1924).

D. F. B. (C. A.)

PATENTS

Method of enameling centrifugally cast pipe. JAMES B. LADD. U. S. 1,521,634, Jan. 6 1925. The method of applying enamel to the inside of centrifugally cast pipe

which consists in floating the enamel on the surface of the molten metal in the container through which said metal is introduced into the rotating mold and pouring said metal and enamel simultaneously into the mold.



Glass

New jar machines increase glass plant efficiency. ANON. *Ceram. Ind.*, 3 [6], 388-9(1924).—The plant of the Ohio Glass Products Co. is described. The efficiency of the gas producer is such that 1000 lbs. of coal will make one ton of melted glass or the equivalent of a gas rate of less than 20 cts. per thousand. After the batch of raw materials is weighed, it is mixed for 3 min. and delivered to the tank into which it is fed automatically at a given rate. The tank which has a daily capacity of 60 T. is 47 ft. in length and 19 ft. in width with a firing chamber 33 ft. in length. About 48 hours are required for the raw batch to travel from the doghouse to the working chamber. The temp. in the firing chamber is 2100°F and in the mtg. chamber 2500°F. The working end of the tank is lined with cork brick which makes the use of a heavy air blast unnecessary. The machines which were invented by SAMUEL WINDER and HENRY DAUBENSPECK are described in full.

P. D. H.

Glass tank operation. ANON. *Ceram. Indus.*, 4 [1], 20-9(1925).—This is a report of an invest. in the glass field and includes the ideas of prominent glass fur. engineers and operators on tank construction and opern. There are a number of sketches showing different types of ports and of construction in general. A large amt. of glass tank data, resulting from questionnaires, is given in tabular form and discussed. There are curves showing the proper capacity at which a glass tank can be run the most economically so far as fuel and refrac. are concerned.

P. D. H.

A revolutionary development in making clear fused quartz. STAFF ABSTRACT. *The Ceramist*, 4, 165(1924).—A description of the process recently developed by the General Electric Company.

C. W. P.

Principles of glass making. R. R. SHIVELY. *The Ceramist*, 4, 136-42(1924).—Primary calcns. for wt. of glass produced from the batch and the percentage lost in melting; calcn. of the cubical expansion; calcn. of batch from anal. or compn.

C. W. P.

Principles of glass making. R. R. SHIVELY. *The Ceramist*, **4**, 237-43(1924).—The chem. raw mats. used in the mfg. of glass together with their influence on phys. properties; method of making necessary batch calcs.; oxidizing agents; decoloring agents; color agents; opacifiers. C. W. P.

Principles of glass making. R. R. SHIVELY. *The Ceramist*, **4**, 287-93(1924).—Recent glass developments, causes and effect. Chiefly a summary of conclusions reported by W. E. S. TURNER and relating to the use of lower lime and higher alkali content in glass batches as a result of the introduction of automatic machinery. The resultant glass melts more rapidly, sets more slowly, anneals at lower temps., has lost some mech. strength and is less resistant to chem. corrosion. Granular soda ash has at least 5% greater efficiency than the powdered due to increased purity and decreased loss by moving gases of combustion. The manganese introduced as a decolorizer is nearly as valuable as alumina in influencing durability of glass. The substitution of selenium and consequent replacement of sodium nitrate by sodium carbonate has resulted in use of a greater alkali content. The use of salt cake has become more general. The amt. rarely exceeds one lb. per 100 of sand. It aids in preventing the formation of scum at the mtg. end of the tank and in getting rid of the organic matter. The use of ground burnt lime increases the mtg. capacity of tanks. C. W. P.

The principles of glass making, use of selenium in glass. R. R. SHIVELY. *The Ceramist*, **4**, 371-4(1924).—Use of selenium in this country was introduced by NICHOLAS KOPP in 1894. It has extended rapidly since the war. In the prepn. of ruby glass the usual constituents are sand, soda, zinc oxide, borax and bone ash. The amt. of selenium used varies from 5 to 18 lbs. and many glass makers use the same amt. of cadmium sulphide as selenium while others double that quantity. From 10 to 15% of zinc oxide is necessary. Selenium gives excellent results in the prepn. of amber glass. From 4 to 6 lbs. to 1000 lbs. of sand is used. A lime batch gives a wine color. True amber is produced in a lead batch. As a decolorizer 1 oz. of selenium is equivalent to not less than 10 lbs. of manganese. The amt. of selenium required to decolorize 100 lbs. of sand varies from $\frac{1}{10}$ to 1 oz. depending upon the iron content of the mats. used. Arsenic is used in almost every case and if the quantity is increased the amt. of selenium also must be increased. Use of niter necessitates an increased amt. of selenium. The same is true of salt cake. Because of the small amt. of selenium used, and its strength, it is recommended that it be diluted. A suitable ratio is 1 lb. to 7 lbs. of arsenic. C. W. P.

A glass die. ANON. *Brit. Clayworker*, **33**, 237(1924).

H. G. S.

The effect of various constituents on the viscosity of glass. S. ENGLISH. *Pottery Gaz. and Glass Trade Rev.*, **49**, 567, 1518(1924).—To the glass manufacturer, the viscosity of molten glass is perhaps its most important property. The glasses used consisted of a series of soda lime silicates, soda magnesia silicates, and soda alumina silicates obtained by a mol. substitution of one of these basic oxides for sodium oxide in a simple sodium silicate of the molecular formula, $2\text{Na}_2\text{O}_3\cdot 6\text{SiO}_2$. The "rotation" method was used for the viscosity detns. as it is applicable over a long range. The glass was melted from cullet in a standard-sized cylindrical unglazed porcelain beaker, and an iridio-platinum sheath fastened on the end of a porcelain rod was rotated on its own axis in the center of the beaker of glass. The time required for the iridio-platinum sheath to complete one revolution under different turning forces, at various temps., was detd., and the viscosity was obtained as a function of the product of the effective pull and the time of rotation. The app. was calibrated by using syrup, the viscosity of which was predetd. by ordinary methods. The viscosity curves from about 750 to 1400°C show how the viscosity is increased by substitution and decreased by a temp. rise. The logarithm curve indicated that the temp. interval required to halve the viscosity continued to increase as the temp. rose. P. D. H.

Alumina silica minerals in glasshouse pots and tank blocks. W. J. REES. *Pottery Gaz. and Glass Trade Rev.*, **49**, 567, 1518(1924).—This is a confirmation of the findings of N. L. BOWEN, and J. W. GREIG of the Geophysical Laboratory, Washington, D. C., with regard to there being only one compd. of alumina and silica stable at high temps., namely $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$, instead of its being sillimanite $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$. The propn. of the former present in refrac. was found to depend on the compn. of the clay and the degree and duration of htg., and was influenced by contact with or absorption of silicate melts, such as glass. P. D. H.

The thermal endurance of glass. V. H. SCOTT. *Pottery Gaz. and Glass Trade Rev.*, **49**, 567, 1519(1924).—The ability of a glass to withstand thermal shocks depends upon the size and shape of the object and on the manner in which the shocks are applied. The expts. showed that rupture was generally produced by local differences in temp. rather than by the uniform contraction of large surfaces. As the fracture was almost instantaneous the condy. of the glass could be of little importance. P. D. H.

The origin of glass. ANON. *Pottery Gaz. and Glass Trade Rev.*, **49**, 567, 1519 (1924). P. D. H.

Colloidal protection. J. ALEXANDER. *Jour. Soc. Chem. Ind.*, **43**, 1256–8(1924).—Individual silicates in glass tend to crystallize, but in admixture they form a mutually protective chain, being so chosen by the glassmaker. If the mixt. is not right, or if it has been hot for too long, the chain breaks down and the glass devitrifies. The author defines a protector as a subs. that opposes the aggregation of molecules or particles into larger groups; and he deals with protection, plural protection, autoprotection, and cumulative protection. To establish some measure of protective action, ZSIGMONDY detd. the number of mgms. of protective subst. which would just fail to prevent 10 cc. of pure colloidal gold soln. 0.005–0.006% of gold from changing its color from red to violet upon addn. of 1 cc. 10% NaCl soln. A table of these "gold numbers" is given, all of organic subs. except stannic acid sol. H. H. S.

A study of recent attempts to produce high resistance glasses. W. E. S. TURNER. *Jour. Soc. Chem. Ind.*, **43**, 1262–3(1924).—Commencing with $\text{Na}_2\text{O} \cdot 3\text{SiO}_2$, the substitution of CaO for Na_2O increases stability. Glass contg. less than 2% CaO is rapidly attacked by water, and as the amt. of CaO increases beyond 3% the corrosion rapidly diminishes. Substitution of Na_2O by other alkaline earths or alumina gives similar results. Substitution of MgO for CaO gives a slightly more durable glass. Zirconia and titania give results intermediate between CaO and MgO. The mat. extracted from glass by corrosion varies with the type of glass, but the alkali constituents are always in excess in the soln. The order of soly. is: K_2O , Na_2O , B_2O_3 , BaO, CaO, MgO, PbO, ZnO, Al_2O_3 , SiO_2 . Hence the more SiO_2 which can be melted into the glass the greater the durability. B_2O_3 , although fairly sol., is exceptional in that it increases the durability if present up to 12%; it also reduces coeff. of expansion and enhances the optical properties of the glass. In 1893, high resist. borosilicate glass was made at Jena, and since then the use of B_2O_3 with high SiO_2 content has been extensively developed. Silica raises the fusion point, hence the limiting SiO_2 content is detd. by the ability to bring the mats. to fusion in operations on a commercial scale. H. H. S.

Census of glass manufacturing firms for 1923, compared with figures for 1921. ANON. (Dept. of Commerce.) *Nat. Glass Budget*, **40** [25], 3(1924).

Color imparted to glass by ceria. KIRSUZO FUWA. *Jour. Jap. Cer. Assn.*, **32** [375], 91–3(1924).—Commercial ceria usually contains praseodymium and other rare earth metals. Its brown color varies with the content of the said element. F. has used a faint yellow ceria obtained by igniting the purest nitrate obtainable in the country. Chem. formulae of the glasses were $\text{R}'_2\text{O} \cdot \text{R}''\text{O} \cdot 3\text{SiO}_2$ and $\text{R}'_2\text{O} \cdot \text{R}''\text{O} \cdot 0.5\text{B}_2\text{O}_3 \cdot 3\text{SiO}_2$, where R' and R'' represent Na or K and Ca, Mg, Zn, Ba or Pb resp. I. *Influence of*

the compn. of glass upon its color given by ceria. Ceria gives a yellow to glass and the influence of its compn. on the color is slight. Strictly speaking, however, distinct influence is observable; e. g., 2% ceria gave dark yellow to alkali-lead boro silicate glasses, while the same amt. imparted slight yellows to alkali-magnesium, zinc or barium silicate glasses. Generally speaking, the yellow is dark in lead glasses, clear dark in boron glasses and light in ordinary silicate glasses. Sodium-magnesium or zinc borosilicates have red shades, while potassium-calcium, barium or lead silicate glass tends to show a greenish tint. II. *Effect of oxidizing agent on the coloration.* 1% of potassium nitrate mixed to the batches has shown no effect on the coloration given by 2% of ceria. S. K.

Coloring glasses with copper (1st. report). KITSUZO FUWA. *Jour. Jap. Cer. Assn.*, **32** [376], 138-47(1924).—Coloring action of copper and its compds. on glasses with formula of $R'_2O \cdot 3SiO_2$, $R'_2O \cdot R''O \cdot 3SiO_2$, $R'_2O \cdot 0.5B_2O_3 \cdot 3SiO_2$, $R'_2O \cdot R''O \cdot 0.5B_2O_3 \cdot 3SiO_2$, $1.3R'_2O \cdot R''O \cdot 6SiO_2$ or $R'_2O \cdot B_2O_3 \cdot 6SiO_2$ is reported. *Copper and its oxides.* (1) CuO. 1% of the oxide produced colors varying from slight blue to dark indigo. In general, soda glasses were colored darker than potash ones. Boron, barium or lead intensified the color. Boric acid encouraged the development of green. Effects of reheating glasses colored with 1-3% CuO are described. The potash borosilicate glass was covered with a thin ruby-red layer. (2) Cu_2O . Colors given by 1% of the oxide varied from slight to dark blues with exception of $K_2O \cdot CaO \cdot 3SiO_2$, $K_2O \cdot ZnO \cdot 0.5B_2O_3 \cdot 3SiO_2$ and $1.3K_2O \cdot ZnO \cdot 6SiO_2$ which were colorless, light purplish blue and light yellowish brown resp. (3) Cu. 1% of metallic copper imparted to most of the glasses colors varying from almost colorless to dark blue, while $R'_2O \cdot CaO \cdot 3SiO_2$, $K_2O \cdot ZnO \cdot 3SiO_2$ and $R'_2O \cdot BaO \cdot 0.5B_2O_3 \cdot 3SiO_2$ were colored yellowish brown, light yellow and greenish brown resp. Generally speaking, coloring action of metallic copper is still weaker than that of Cu_2O . *Copper salts.* (1) $CuCl_2 \cdot 2H_2O$ and Cu_2Cl_2 . 2.15% of cupric chloride gave the glasses blue or greenish blue of various intensities, except $K_2O \cdot CaO \cdot 3SiO_2$ and $K_2O \cdot ZnO \cdot 3SiO_2$ which were colored light and dark brown, resp. 1.25% of cuprous chloride colored $Na_2O \cdot BaO \cdot 3SiO_2$, $Na_2O \cdot ZnO \cdot 0.5B_2O_3 \cdot 3SiO_2$ and $K_2O \cdot CaO \cdot 0.5B_2O_3 \cdot 3SiO_2$ dark brown, light yellow and brown, resp., the other glasses being colored blue. (2) $CuSO_4 \cdot 5H_2O$. 3.15% of the sulphate imparted blues or indigo blues to most of the glasses, though $Na_2O \cdot ZnO \cdot 3SiO_2$ was brown and $K_2O \cdot BaO \cdot 3SiO_2$ dark blackish brown. All batches contg. lead produced a dark blue alabaster, probably owing to the formation of lead sulphate. (3) $Cu(NO_3)_2 \cdot 6H_2O$. 3.75% of the nitrate produced blue, dark blue or indigo blue in all glasses. The blue coloration is even stronger than that with CuO. (4) $CuCO_3 \cdot Cu(OH)_2$. 1.4% of malachite green produced opaque vermilion in $Na_2O \cdot CaO \cdot 3SiO_2$ and opaque dark brown in $K_2O \cdot CaO \cdot 3SiO_2$, while it gave various blues to other glasses. (5) $Cu(C_2H_3O_2)_2 \cdot aq.$ 2.52% of the acetate gave light yellow, yellowish green, yellowish, reddish or greenish brown to the glasses with exception of $Na_2O \cdot CaO \cdot 3SiO_2$ and $Na_2O \cdot PbO \cdot 3SiO_2$ which were colored blue. S. K.

Coloring glasses with copper (2nd rept.). KITSUZO FUWA. *Jour. Jap. Cer. Assoc.*, **32** [377], 167-78(1924).—*Effect of oxidizing agent on colors produced by copper and its oxides.* Full coloring power of 1% CuO was developed in batches contg. same amt. of niter, while 1-2% of niter were required to produce deepest blue with 1% of Cu_2O or metallic copper. *Effect of oxidizing agent on colors produced by copper salts.* 1-4% of the oxidizing agent was added to those batches which had produced colorless glasses or glasses with colors other than blue in the expts. described in the first report. Batches with cupric chloride required 1-2% of the oxidizing agent to produce a blue. Those with cuprous chloride, copper sulphate or basic carbonate gave blue glasses with 1% of niter. Batches with copper acetate required 1-4% for the same purpose. Generally speaking, potash glasses seem to consume more niter than soda glasses. *Effect*

of reducing agent on colors produced by copper oxides. (1) Cupric oxide. In an expt. with batches contg. 1% of cupric oxide after melting, 0.5% of potassium tartrate produced a red in $\text{Na}_2\text{O} \cdot \text{CaO} \cdot 3\text{SiO}_2$ or $\text{K}_2\text{O} \cdot \text{ZnO} \cdot 3\text{SiO}_2$, a light pink in $\text{Na}_2\text{O} \cdot \text{BaO} \cdot 3\text{SiO}_2$ and a reddish brown in $1.3\text{Na}_2\text{O} \cdot \text{CaO} \cdot 6\text{SiO}_2$, while its 0.5–5.0% produced blues or browns in the other glasses. Nodules of copper or lead were found very often on the bottom of pots. (2) Cuprous oxide. Addition of 0.5% of the reducing agent together with 1.0% of cuprous oxide resulted in the production of a brown glass in most cases, though a few glasses were colored light blue. *Effect of reducing agent on colors produced by copper salts.* The proportion of a copper salt in a batch was such that its oxide corresponded to 1% of the glass. (1) Cupric chloride. Only 0.5% of the reducing agent revealed marked changes in color of $\text{R}'_2\text{O} \cdot \text{R}''\text{O} \cdot 3\text{SiO}_2$; e. g., $\text{K}_2\text{O} \cdot \text{CaO} \cdot 3\text{SiO}_2$ and $\text{Na}_2\text{O} \cdot \text{BaO} \cdot 3\text{SiO}_2$ gave a dark red glass. The effect was much more gradual in borosilicate glasses. (2) Cuprous chloride. Compns. of the glasses have shown strong influence on the action of the reducing agent, and the influence of $\text{R}''\text{O}$ seems to be stronger than that of $\text{R}'_2\text{O}$. (3) Copper sulphate. $\text{R}'_2\text{O} \cdot \text{R}''\text{O} \cdot 3\text{SiO}_2$ glasses were colored brown by 1–2% of the reducing agent, while borosilicate glasses required its 5% for it. (4) Copper nitrate. The salt consumed much more reducing agent than other salts in melting. (5) Basic carbonate of copper. Brown opaque glasses were obtained with 1–5% of the reducing agent. S. K.

Coloring glasses with copper (3rd rept.). KITSUZO FUWA. *Jour. Jap. Cer. Assn.*, 32 [378], 204–33 (1924).—*Effect of arsenious acid on colors produced by copper and its oxides.* (1) Cupric oxide. Arsenious acid produced reds in soda-lime glasses. In many other glasses, it reduced the oxide to metallic copper and caused only a slight change in colors. (2) Cuprous oxide. Red glasses were given with $\text{Na}_2\text{O} \cdot \text{CaO} \cdot 3\text{SiO}_2$ and zinc glasses, while the other glasses showed only slight changes in colors, the oxide being generally reduced to metallic globules. (3) Metallic copper. The results obtained with metallic copper and its oxides indicate that arsenious acid acts to reduce the oxides and also to accelerate the growth of copper particles. *Effect of arsenious acid on colors produced by copper salts.* The action is chiefly a reduction, copper globules or red glasses being produced. However, no or slight effect was observed in batches contg. nitrate or acetate of copper. *Effect of stannic oxide on colors produced by copper and its oxides.* The effect of stannic oxide on the colors is not alike in different glasses. However, it seems to act as a reducing agent. Of 42 batches contg. 1% of cupric oxide and 0.5–2.0% of stannic oxide, only 6 batches of $\text{Na}_2\text{O} \cdot \text{CaO}$ (or ZnO) $\cdot 3\text{SiO}_2$ and $1.3\text{K}_2\text{O} \cdot \text{ZnO} \cdot 6\text{SiO}_2$ gave red glasses. *Effect of stannic oxide on colors produced by copper salts.* The influence of variation in compn. of the glasses, kind of salts and their amt. on the action of stannic oxide is very strong. The oxide seems sometimes to act even as an oxidizing agent. *Effect of antimony oxide on colors produced by copper oxides.* The effect of antimony oxide resembles that of stannic oxide when cupric oxide is concerned. It is very slight for cuprous oxide. *Comparison of the effect of stannic oxide and antimony oxide on colors produced by copper oxides.* Antimony oxide seems to have stronger effect in changing colors produced by cupric oxide than stannic oxide. It is quite reverse for cuprous oxide. Antimony oxide tends to produce metallic copper, while stannic oxide tends to develop ruby colors. *Effect of reducing agent and stannic oxide on colors produced by cuprous oxide.* Generally speaking, an addition of potassium tartrate together with stannic oxide produces a darker color than that obtained when one of them is used. *Effect of stannic oxide and arsenious acid on colors produced by cupric oxide.* The result of tedious expts. is very complicated. *Effect of antimony oxide and potassium tartrate on colors produced by cuprous oxide.* Glasses have shown suspensoid of metallic copper or sufficient deposit of copper globules, indicating reducing action of antimony oxide and the tartrate. *Effect of antimony oxide and arsenious acid on colors produced by cuprous oxide.* The result of numerous meltings indicates that their effect is very slight. S. K.

On the weathering of bulb glass. SANGORO TAKAHASHI. *Jour. Jap. Cer. Assn.*, **32** [378], 233-8(1924).—Resistance of two bulb glasses, $0.9\text{Na}_2\text{O} \cdot 1.1\text{PbO} \cdot 0.6\text{SiO}_2$ and $1.3\text{Na}_2\text{O} \cdot 0.7\text{CaO} \cdot 0.6\text{SiO}_2$, to weathering has been studied. I. Expts. on storing. The following tables show the results.

TABLE I. WEATHERING IN A CONCRETE STOCK-HOUSE

| Methods of storing | After 1 month | | After 2 months | | After 3 months | | Ease of washing weathered products off | |
|---|----------------|--------------------|----------------|--------------------|--------------------|--------------------|--|------------------|
| | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass |
| Packed as usual | Dimmed | Dendritic crystals | Spotted | Dendritic crystals | Snow-like crystals | Dendritic crystals | Very difficult | Pretty difficult |
| Packed as usual, but together with Adsol (fullers' earth) | None | None | Dimmed | Dendritic crystals | Spotted | Dendritic crystals | Difficult | Easy |
| Packed as usual, after washing with dil. HCl | None | None | None | Granular crystals | Almost none | Granular crystals | Easy | Easy |

TABLE II. WEATHERING OF BULBS, WASHED WITH VARIOUS REAGENTS, IN AN APPARATUS SATURATED WITH WATER-VAPOR AND 40°C HOT

| Solutions | After a week | | After two weeks | | Ease of washing weathered products off | |
|--------------------------------|----------------|--------------------|--------------------|--------------------|--|------------------|
| | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass |
| 1/50 $N \text{H}_2\text{SO}_4$ | None | Dendritic crystals | Fairly dimmed | Dendritic crystals | Fairly difficult | Fairly difficult |
| 1/500 $N \text{HCl}$ | None | Fairly dimmed | None | Dimmed | Good | Easy |
| Water (10°C) | None | Fairly dimmed | Fairly dimmed | Dimmed | Fairly difficult | Easy |
| Water (70°C) | None | Fairly dimmed | None | Dimmed | Good | Easy |
| Unwashed bulb | Spotted | Dendritic crystals | Snow-like crystals | Dendritic crystals | Very difficult | Fairly difficult |

II. Expts. on glass compn. The effect of introducing some ingredients to above glasses has been studied with results as follows:

TABLE III. WEATHERING OF BULB GLASSES CONTAINING SPECIAL INGREDIENTS

| Ingredients | After a week | | After two weeks | | Ease of washing weathered products off | |
|-----------------------------|----------------|---------------------|--------------------|---------------------|--|------------------|
| | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass |
| None | Spotted | Dendritic crystals | Snow-like crystals | Dendritic crystals | Very difficult | Fairly difficult |
| B_2O_3 3.0% | Fairly dimmed | Cluster of crystals | Dimmed | Cluster of crystals | Difficult | Easy |

TABLE III (Continued)

| Ingredients | After a week | | After two weeks | | Ease of washing weathered products off | |
|-------------------------------------|----------------|----------------|-----------------|-------------------|--|----------------|
| | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass |
| Al ₂ O ₃ 3.0% | None | Fairly dimmed | Fairly dimmed | Minute crystals | Fairly difficult | Easy |
| TiO ₂ 1.5% | Fairly dimmed | Dimmed | Fairly dimmed | Dimmed | Fairly difficult | Easy |
| ZrO ₂ 1.5% | None | Fairly dimmed | Fairly dimmed | Minute crystals | Fairly difficult | Easy |
| SnO ₂ 1.5% | None | Fairly dimmed | Fairly dimmed | Granular crystals | Fairly difficult | Easy |
| ThO ₂ 1.5% | None | Fairly dimmed | Fairly dimmed | Minute crystals | Fairly difficult | Easy |

The effect of replacing a part of soda by potash has been experimented.

TABLE IV. WEATHERING OF BULB GLASSES WHOSE SODA HAS BEEN PARTIALLY REPLACED BY POTASH

| Per cent potash in total alkalis | After a week | | After two weeks | | Ease of washing weathered products off | |
|----------------------------------|----------------|----------------|-------------------|---------------------|--|------------------|
| | The lead glass | The lime glass | The lead glass | The lime glass | The lead glass | The lime glass |
| 40% | None | Fairly dimmed | None | Cluster of crystals | Easy | Easy |
| 50% | None | Almost none | None | Cluster of crystals | Easy | Easy |
| 70% | None | Almost none | Minute crystals | Minute crystals | Easy | Easy |
| 100% | Fairly dimmed | Spotted | Granular crystals | Thin film | Fairly difficult | Fairly difficult |

S. K.

The electrolysis of soda-lime glass. I. Evolution of gas and its relation to sorption and conductivity. J. W. REBBECK AND J. B. FERGUSON. *J. Am. Chem. Soc.*, **46**, 1991-2002(1924).—The reversible phenomena of gas evolution which take place during the electrolysis of glass under proper conditions have been shown to be due probably to the action of Na upon the sorbed water and the simultaneous electrolysis of the hydroxide formed. Appreciable gas evolution may be obtained with voltages as low as 1.3 v. The sorption of water does not affect the resistance of soda-lime glass. The evolution of gas on electrolysis constitutes a new method for studying the *sorption of water by glass*. The possible adsorption of H ions by glass and also their elec. migration into glass are indicated.

F. L. B. (C. A.)

The production of high-grade colorless glass in tank furnaces. G. O. SMITH. *Glass Ind.*, **5**, 1-2(1924).—Se as a decolorizer is recommended and hints are given for its use.

J. B. P. (C. A.)

Modern blown bottles. C. W. AKERLOW. *Glass Ind.*, **4**, 185-8(1923).—Defects and remedies in the blowing of bottles by the Owens machine are noted.

J. B. P. (C. A.)

The etching and polishing of glass. O. SCHARTZBACH. *Diamant*, **45**, 369(1923).—The carefully cleaned glass is subjected to a preliminary treatment in a dil. soln. of HF. If a fine-grained mat surface is desired, a soln. of acid KF in H₂O to which 10-20% of

NH_4F has been added is recommended as a bath. The Na salt gives a coarser mat. A dip in a dil. HF bath tends to dissolve off the mat surface. Strong acid dissolves the glass unevenly, yielding a poor surface. A 50% soln. of com. HF in H_2O is suggested for etching potash glasses. Na_2SiF_6 being more sol. than the K salt, a stronger acid is required for Na glasses to get the same results. The addition of concd. H_2SO_4 to strong HF causes the evolution of bubbles of gaseous HF, which produces line etching on coming in contact with glass. By gentle agitation the lines upon the glass may be formed as spirals. A bath of H_2SO_4 2 and HF 1 is favorable to line etching. Combinations of these etching methods with the etching of designs on glass through wax produce beautiful effects. In mat etching as outlined above the evolution of gas bubbles is avoided as far as possible. By adding 6 parts of H_2SO_4 to 1 of HF the bath becomes so viscous that the liberation of the bubbles is hindered and small globules attach themselves to the glass surface, insulating it temporarily from further attack at that point. Thus in this way also a mat surface is etched upon the glass the bubbles acting similarly to the protective salts on the glass surface.

J. B. P. (C. A.)

The silvering of glass ornaments. OTTO WILHELMY. *Diamant*, **45**, 337-8(1923).—Detailed instructions.

J. B. P. (C. A.)

Problems of the German glass industry. HUGO KÜHL. *Diamant*, **46**, 217-8 (1924).—A discussion mainly of German raw materials.

J. B. P. (C. A.)

The Fourcault process of drawing sheet glass at Clarksburg. ANON. *Glass Ind.*, **5**, 59-68(1924); 18 figs.—A description of the process and the new plant of the Am. Sheet Glass Co.

J. B. P. (C. A.)

The design of a 14-pot recuperative glass furnace. E. W. KOERING. *Glass Ind.*, **5**, 105-9(1924); illus.—Includes a small bibliography.

J. B. P. (C. A.)

Operating glass tanks. B. SCHIEDROP. *Fuels & Furnaces*, **2**, 43-6(1924); cf. *ibid*, **1**, 443; and *C. A.*, **18**, 315.—Data and method for calcg. the amt. of heat required to melt the batch and cullet assuming the elimination of all losses are given.

D. F. B. (C. A.)

Jena glass. THIENE. *Keram. Rundschau*, **32**, 66-8; *Glass Ind.*, **5**, 81-2(1924).—An account of the different divisions of glass manuf. of Schott & Co.

D. E. S. (C. A.)

Certain effects produced by chilling glass. A. Q. TOOL AND C. G. EICHLIN. *J. Optical Soc. Am.*, **8**, 419-50(1924).—The view is advocated that at every temp. glass tends toward an equil. condition which is a function of that temp. While the condition of perfect stability at room temp. may never be reached, because the mobility of glass becomes too low, it is shown from the results of expts. that what appear to be stable conditions for given temps. are approached with rapidity at temps. slightly above the usual annealing range. In procuring the data on which this conclusion is based heating curves were obtained on samples of glass, each of which had received one of a number of different annealing and chilling treatments. A method of comparing these curves was devised to show more clearly the effect of these treatments on the characteristic heat absorption and evolution effects in glass. It was also found that the density of the glass in agreement with the above view differed markedly with the treatment the glass had received, and that the treatment required to produce either an increase or decrease in the vol. could be detd. from a study of the heating curves. The effects observed are discussed in detail, the conclusion being that they result either from the continual formation of more complex mols. or aggregates or from the general tendency of the mols. to assume a greater compactness as the temp. is lowered, and from their disintegration or sepn. on heating. Such transformations coupled with the tendency of these substances to become superheated or undercooled because of the low mobility of the glass are shown to be sufficient to explain all heat effects observed in the annealing region. Mention is made of the bearing of the results of this investigation on problems

in practical glass manuf. involving the durability, stability, deformability, coloration, crystn., homogeneity, and such heat treatments as annealing and hardening. The possible relation between the vol. changes observed and the ice point fluctuations in thermometers and the breakage of unequally heated glasses, such as searchlight mirrors, is also pointed out.

G. E. B. (C. A.)

Fused, bubble-free quartz; an historical rectification. M. v. SCHWARZ. *Physik. Z.* **25**, 374-6(1924).—Attention is called to the fact that in 1913 Hugo Helberger produced fused quartz, free from bubbles and strain, in pieces as large as one's fist, and suitable for use in optical instruments. The quartz was fused *in vacuo* and cooled under the pressure of a compressed gas. HELBERGER's patent specifications are described, and photographs are given of the furnace and of specimens of the quartz. This article was occasioned by the description of an apparently similar process published recently by the General Electric Co.

R. H. L. (C. A.)

Viscosity of glass. H. LE CHATELIER. (Meeting Acad. des Sciences, Oct. 20, 1924.) *J. Soc. Chem. Ind.*, **43**, 1255(1924).—Within a temp. difference of 500 to 1000°C the viscosity of glass may vary from 1 to 1 milliard.

H. H. S.

Special sands. W. M. WEIGEL. *Repts. of Investigation*, No. 2646(1924).—Dept. of Interior, Bur. Mines Serial.

P. D. H.

PATENTS

Mold for making glass spark-plug bushings. MAURICE A. SMITH and JOSEPH BLAZE. U. S. 1,522,150, Jan. 6, 1925. A glass-molding app. comprising a mold having a plurality of molding cavities, separately mounted plungers adapted to reciprocate vertically into and out of said cavities, and means for simultaneously reciprocating all of said plungers.

Process of making high-grade glass. CHARLES E. PARSONS. U. S. 1,522,697, Jan. 13, 1925. The process of making glass from blast fur. slag which consists in finely dividing said slag; digesting the finely divided slag with a soln. of an alkali metal silicate to form calcium and magnesium silicates; sepg. out said calcium and magnesium silicates; adding to the latter such other constituents as are necessary to complete a desired glass

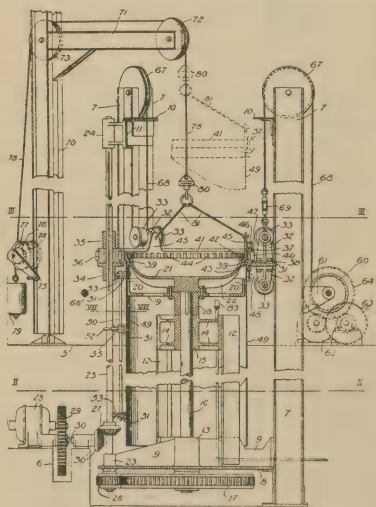
making charge; and causing the constituents of the completed charge to react to form the desired glass.

Method of and apparatus for making glass.

WALTER O. AMSLER. U. S. 1,523,157, Jan. 6, 1925. App. for the manuf. of glass cylinders comprising a supporting frame, a receptacle supported in the frame, means for rotating the receptacle, a drive-ring movable longitudinally in the frame, means for effecting the longitudinal movement of the drive-ring, means for rotating the drive-ring at substantially the same speed as the receptacle, a mold cylinder carried by the drive-ring, a draw-ring carried by the drive-ring and movable therewith, and means for effecting a sep. movement of the draw-ring.

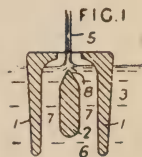
Glass. F. M. OPPERMANN. Brit. 216,494, May 23, 1923. Ingredients of a batch for glass making are melted in a pot or tank furnace and the "metal" is ladled or poured into a pot

which is placed in a refining furnace. After the "metal" is completely refined, the pot is removed and placed in a tunnel through which it is mechanically conveyed. The

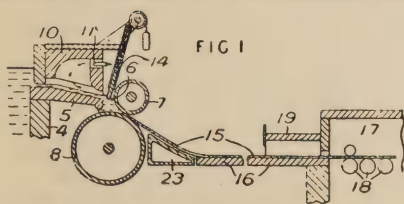


tunnel is heated (similarly to the usual form of leer) so that when the pot reaches the exit the "metal" has cooled to the working temp. (C. A.)

Glass manufacture. PILKINGTON BROS., LTD., GLASS WORKS, and D. RAILTON. Eng. Pat. 13,622(1923); *Pottery Gaz. and Glass Trade Rev.*, 49 [567], 1536(1924). In an app. for drawing sheet glass the metal is conducted from a region below the surface of the molten mass through two channels to the two sides respectively of the line of draw, in order to secure an even temp. on both sides of the sheet at the drawing point. App. for carrying out the process consists of a refrac. structure, comprising outer walls 1 and a central partition 2, which is inserted in the mass 3 of the molten glass, as shown. The sheet 5 is drawn from a line above a ridge 8 formed on the partition 2, and the metal that forms the sheet is drawn from a region 6 below the surface of the molten mass and flows to the drawing point through the two channels 7 at the sides of the partition. The outer walls 1 may be continued upwards to form a drawing-chamber, and they may be integral with or separate from the partition 2. In the latter case the partition and the walls may be movable relatively to one another so that, by varying the width of the channels 7, any difference of temp. between the two streams of metal may be compensated.



Glass manufacture. PILKINGTON BROS., LTD., GLASS WORKS, and E. B. LE MARE. Eng. Pat. 6,094(1923); *Pottery Gaz. and Glass Trade Rev.*, 49 [567], 1536 (1924). In a process of producing a continuous strip of glass by rolling molten glass as it issues from a tank fur., the strip as it issues from between the rollers is drawn over a flat stationary bed on its way to the leer, the bed being of such a length that the plastic strip becomes flattened and sets before it passes on to the rollers in the leer. The glass issues from the tank 4 by a shoot 5 and forms a pool 6 in the pass between the rollers 7, 8. The shoot is provided with side walls and a crown 10, and the space thus formed is htd. by burners 11. An adjustable gate 14 regulates the arc of contact between the pool and the roller 7, and this arc is less than that between the pool and the roller 8. The glass strip 15 as it issues from between the rollers passes on to a stationary bed 16, 23 and thence into the leer 17, where it is supported on rollers 18 which are also rotated to draw the strips. The bed consists of a curved portion 23 and a flat portion



16, part of which may be covered by a hood 19 to enable the rate of cooling of the strip of glass to be controlled. The flat bed enables the sheet to become flattened by its own weight, and the length of the bed is such that the strip has become sufficiently hardened by the time it enters the leer to resist deformation when passing over the rollers 18. The shoot 5 may be replaced by a short horizontal conduit or even a slot in the wall of the tank. The rollers are preferably arranged, as shown, with the upper one in advance of the lower, but they may be vertically one above the other or their axes may be in the same horizontal plane. The lower roller is preferably of greater diameter than the upper roller, and may be replaced by a chain table of any known construction.

Heavy Clay Products

How a notebook helped to build a real plant. ANON. *Brick and Clay Rec.*, 65 [12], 827-31(1924).—The new plant of the Darlington Clay Products Co. at Darlington, Pa., is described fully. The plant was designed by C. FORREST TEEFT. A layout is given showing the location of equipment and the size of motor drives. A number of photographs are also shown. Gray and manganese face brick are manufd. The plant is

operating on a No. 2 fire clay known as Lower Kittanning which is taken from a drift mine $\frac{1}{4}$ mile away. The clay is crushed at the mouth of the mine, dumped into $1\frac{1}{2}$ yd. "V" type dump cars and hauled to the plant by a Plymouth gasoline locomotive. The clay is dumped onto a link-belt plate feeder which feeds the clay onto a 20-inch rubber conveyor belt 90 ft. in length and operating at an angle of $22\frac{1}{2}^{\circ}$ to the horizontal. From this the clay is dumped onto an 85 ft. horizontal conveyor belt, which runs the length of the 1500 ton storage bin in the monitor of the building. Old belts are used as scrapers to push the clay off the conveyor belt. The two conveyor belts and the plate feeder are driven by a 10-h. p. motor. There are 4 reclaiming conveyors, two at each side of and running at right angles to an aisle in the center of the building. These 4 different workings insure uniformity of clay. The conveyor tunnels are sufficiently large to admit a workman readily. The 4 conveyors feed onto a 40 ft. inclined conveyor, at right angles to them, which delivers the clay to the dry pan and also serves as a power transmission belt, operated from the dry pan. The tail shaft of the inclined belt is extended beyond the bearings just far enough to take miter gears which mesh with other gears on short jack shafts. These short shafts which are parallel to the shafts carrying the head pulleys of the reclaiming conveyors are connected with them by sprockets and chains. Four clutches enable any one of the conveyors to be operated at will. The dry pan is a 9-ft. Chambers overhung type with cone shaped bottom. It is belt driven by a 75-h. p. motor. From the dry pan the clay is carried in a bucket elevator to a height of 21 ft. where it is dumped onto a 16-mesh Hummer screen. Over 12 T. of clay are ground and screened per hour. The clay is again elevated the same height and dumped into a steel bin of about 60 T. capacity, the concrete bottom of which is being lined with maple wood in order to insure a free flow of clay. A double elevator and low height screen are used in order to cut down the power required to lift the tailings to the screen, 60% of this material being tailings. A 15-h. p. motor drives both elevators and screen distributor. The clay is fed from the bottom of the bin by a disc feeder into the hopper of a poidometer which delivers it to a screw conveyor. Ground manganese is fed into the same screw conveyor by a parallel poidometer. An elevator then delivers the clay to a Chambers pug mill, from which it is carried on a flight conveyor to the auger machine. A 75-h. p. motor drives the brick machine; a 40-h. p. motor drives the pug mill; and a 20-h. p. motor drives the line shaft, the cutter, conveyor, belts, screw conveyor, poidometers and disc feeder. A complete switch board including a recording voltmeter has been installed. Burke motors and "Condor" brand belts are used throughout. The plant has a daily capacity of 36,000 bricks. The drying and firing system was fully described in *Brick and Clay Rec.*, April 17, May 1, and May 15, 1923. The driers are heated by radiated heat from the products of combustion which are drawn through cast iron pipes beneath the cars. The brick are fired in round down-draft kilns with natural gas. From 25 to 30 men are required to operate the plant.

P. D. H.

Making brick and tile in Durban, South Africa. ANON. *The Clay Worker*, 82 [3], 200-1(1924).—The plant of the Coronation Brick and Tile works is described. It has an annual production of 29 million brick.

P. D. H.

Plant and output of the Birmingham Clay Products Co. ANON. *The Clay Worker*, 82 [3], 202(1924).—The plant is located at Sibleyville, Ala. Common brick, red rough textures, buff and flash brick in smooth and rough textures are made. The daily capacity of the plant is 50,000 face bricks and 25,000 common bricks. The ware is fired in a Haigh continuous kiln and in round and rectangular down-draft kilns. P. D. H.

Firing brick with industrial gas. HUGH H. WIKLE. *The Clay Worker*, 82 [3], 217-20(1924).—City gas was first used in the firing of brick in November, 1923, at the plant of the Lake View Brick Co., of Chicago, Ill. No permanent kilns are used. The

brick are piled in huge rectangular piles, 34 ft. wide, 40 ft. long and 12 ft. high. Arches, 2 ft. high and 18 in. wide, are left every 4 ft. They extend the entire width of the kiln. The brick are set 3 on 3. The gas is delivered to the burners at 12 lbs. pressure. About 20 hrs. are required to fire off a kiln. The gas consumption is about 78,000 cu. ft. per 39,000 bricks. The cost of firing with gas is \$1.80 per thousand brick, whereas the cost of coal and wood which was formerly used was \$2.00 per thousand. Gas has the following advantages over coal and wood fuel: (1) Decrease of over 50% in the firing time; (2) decrease of 66% in labor; (3) more contented workmen; (4) better brick; (5) less loss due to overfired and underfired brick; (6) no storage space required for gas; (7) no smoke nuisance.

P. D. H.

With the Kanases at Kushequa. ANON. *The Clay Worker*, 82 [4], 300-03(1924).—The plants of the Kushequa Ceramic Co. and Kushequa Brick Co., at Kushequa, Pa., are described. The former plant manuf. unglazed floor tile by forcing the plastic clay through a die and cutting the tile from the clay column by a special type cutter. After being dried in direct-fired driers for a week, the ware is set in 28-ft. round down-draft gas fired kilns 7 benches high with a row of fire clay slabs between the 4th, 5th, 6th and 7th benches to keep the rings vertical and to prevent warping. Each bench is 5 tiles in thickness. The ware is fired to 1875°F. The brick plant manuf. smooth and rough face brick, paving and floor brick.

P. D. H.

Making brick at West Point. ANON. *The Clay Worker*, 82 [5], 384-5(1924).—The plant of the West Point Brick and Lumber Co., of West Point, Ky., is described. The plant has a daily capacity of 30,000 bricks of which 60% are rough texture face brick and 40% are red common brick. The raw material is a surface clay which is being worked to a depth of about 12 ft. by a steam shovel, there being no stripping. From the dump trucks, the clay is delivered to a Potts crusher on a feeder belt, thence into a Freeze pug mill and on into a Freeze stiff mud machine. The brick are dried in a waste heat tunnel drier and fired in 6 down-draft coal fired 32 ft. kilns, each having a capacity of 90,000 bricks. The firing is done in from 7 to 8 days. There is a water smoking period of about 24 hrs. during which a temp. of 1200°F is reached. A temp. of 1750° is reached in the next 24 hrs. The temp. is then held at from 1750° to 1800° for 5 days, in order to complete the firing and settling, there being 16 in. of settle to a kiln set 32 courses high. One ton of coal per 1000 bricks is used in firing.

P. D. H.

Modern tile making. XX. ALFRED B. SEARLE. *Brit. Clayworker*, 33, 222-4 (1924).

H. G. S.

A call for extended brick-making operations. ANON. *Brit. Clayworker*, 33, 227-8(1924).—The hand molding and wire cut methods of mfg. brick are described.

H. G. S.

Breakdowns in brickworks. ANON. *Brit. Clayworker*, 33, 236(1924).

H. G. S.

A new brick machine. ANON. *Brit. Clayworker*, 33, 237-8(1924).—A fault which is common to ordinary brick machines lies in the fact that the cog wheels, bearings, and shaft are exposed and unprotected so that dust and dirt have access to these parts, causing unnecessary wear and tear and power consumption. The makers have in previous years attempted to overcome this trouble by boxing in the wheels and running them in oil baths, and the whole driving mechanism was enclosed in sheet metal casings, but all of these methods proved unsatisfactory. A new machine, designed by MAX LIEBSCHER, Meissen, Germany, was exhibited in opern. at Leipzig. The external appearance of this mach. represents a complete change, no moving parts, with the exception of the belt pulley, being visible. All wheels, bearings, shafts, etc., are enclosed in a cast iron cylinder with a removable lid, the casing being completely dustproof and oil tight. The wheels and shafts are made of steel. The wheels have planed teeth and run in oil baths, so that the machine runs smoothly and almost noiselessly. The shafts

run on strong, specially constructed roller bearings. The worm and its casing are made of special steel and their design is based on many years experience. The feed roller is also cased in and is closed by means of an adjustable scraper, so that there is no extrusion of clay. The outside of the machine is therefore always tidy and clean. The machine has a high gearing ratio and can therefore be driven direct from an electric motor, but any form of transmission is equally suitable. This gearing arrangement permits the use of ordinary light belts, thus eliminating the troublesome repair of belts. Furthermore, the belt is not subjected to the usual wear and tear of throwing in and out, since the driving pulley is constructed to act as a friction clutch, which can be regulated to "give" against excessive resist.

H. G. S.

The effect of grading of sand upon the properties of sand-lime brick. H. V. JOHNSON. *Rock Products*, 27 [6], 31-3(1924).—Tensile (a), transverse (b), and compressive (c) strengths all increase with increases in the % sand finer than 100 mesh even beyond the point of max. d. The av. ratios for the exptl. mixts. were $a : b : c = 1 : 2.5 : 14$. The ratio $b : c = 2.5 : 14$ (or $1 : 5.6$) compares favorably to the ratio $1 : 4.6$ which was an av. for 10 com. bricks. The chief disadvantage of adding fine material beyond the point of max. d. is the resulting increase in absorption.

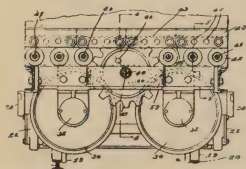
C. H. K. (C. A.)

The modern sand-lime brick plant. C. A. BRESKIN. *Rock Products*, 26, No. 26, 81-4(1923).—A description of the plant of the Grande Brick Co., Grand Rapids, Mich.

E. H. (C. A.)

PATENTS

Vitrified product and process of making same. ARILLE DE GALLAIX. U. S. 1,523,179, Jan. 6, 1925. The herein described vitrified ceramic products composed essentially of powdered slag, powdered grog and plastic clay, the same being fired at a temperature high enough to vitrify the same throughout, such products being substantially impervious to water, oil and grease, and unaffected by frost and atmospheric conditions and being stable against shock.



Transfer car. RAYMOND C. PENFIELD. U. S. 1,523,606, Jan. 20, 1925. An improved transfer car for brick and the like, comprising a frame, a plurality of transversely arranged open troughs mounted thereon, a plurality of rollers mounted in each of said troughs, a platform element comprising a plurality of articulated members arranged in said troughs and movable over said rollers, and means mounted in said frame for moving all of said groups or articulated members simultaneously and transversely of the frame.

Refractories

Refractory minerals produced at Kanakura mine. ANON. *Jour. Jap. Cer. Assn.*, 32 [378], 251(1924).—A white mineral, called "Tōa-hakuseki," is produced with diaspore at Kanakura mine in Shimotakai-gun, Nagano Prefecture. Both minerals are considered as decompn. products of porphyrite. An anal. of the "Tōa-hakuseki," reported by the Imperial Geol. Surv., is: Water 24.28, silica 39.38, ferric oxide 0, alumina 36.94, lime 0, magnesia trace and alkalis 0. It is very probable that the mineral is Newtonite ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 4\text{H}_2\text{O} + \text{aq.}$) contaminated with small proportion of diaspore ($\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$). Greenish "Roseki" (meaning "wax-clay"), found under the diaspore, has compn. as follows:

| | Ig. loss | Silica | Alumina | Ferric oxide | Titanic anhydride | Lime | Magnesium | Total |
|-----|----------|--------|---------|--------------|-------------------|------|-----------|--------|
| (1) | 6.83 | 58.66 | 32.25 | trace | 1.88 | 0.65 | trace | 100.27 |
| (2) | 8.38 | 58.77 | 29.40 | trace | 4.18 | 2.15 | trace | 99.88 |

S. K.

The heat effect on refractory clays and their mixtures. SHINZO SATOH. *Sci. Repts.*, Tohoku Imp. Univ., Series III, 1 [3], 157-201(1923).—I. *Thermal expansion and contraction.* (1) Firing contraction of raw refrac. clay. Dried specimens, formed by molding plastic masses of 3 typical clays, whose compns. were used, are as follows:

| | SiO ₂ | Al ₂ O ₃ | Fe ₂ O ₃ | CaO | MgO | KNaO | Ig. loss | Air shrink- age | Refrac- toriness |
|-----------------------|------------------|--------------------------------|--------------------------------|------|------|------|----------|--------------------|---------------------|
| A Mitsubishi Roseki | 43.30 | 48.16 | 0.26 | 0.26 | 0.01 | 1.52 | 8.02 | 1.4 | SK 34 |
| B Owari plastic shale | 48.02 | 34.02 | 1.93 | 0.54 | 0.17 | 0.54 | 15.35 | 8.2 | SK 33 |
| C Mino plastic kaolin | 52.20 | 33.84 | 1.81 | 0.43 | 0.03 | 0.70 | 11.63 | 6.4 | SK 31 |

Clay A expanded gradually with the rise of temp. up to 700°C; after remaining constant to 900°, the expansion began to decrease and became zero at 1180°. Then, the contraction increased rapidly. The curve of clay B shows a slight contraction at the beginning of the heating and a slight expansion in 300-580°C. Such an initial contraction is not shown in the curve of clay C, indicating only a slight expansion in 300-550°C. Thus, the firing contraction of raw refrac. clay may be classified into two types, one of which expands at low temps., while the other contracts without a marked expansion. (2) Firing contraction of clay mixt. The specimens were cut from green glass pots which had been made of the three clays and broken pots. The result indicates that firing contraction of a clay mixt. is a resultant of contractions of the constituent clays. The shape of the firing contraction curve and the amt. of the final contraction vary with the ratio of the constituent clays. It was also found that (a) the pot body, previously heated, follows the ordinary law of thermal expansion and contraction, until the temp. approaches that previously reached and then the change takes its characteristic course, also that (b) the htg. curve of pot body takes a cuspidal form at a temp. between 500° and 700°C and after being once fired at a very high temp., the complicated length change, which will happen below the temp., vanishes. (3) Firing contraction at a constant temp. The results obtained with clays and pot bodies which were heated at several constant temps. ranging from 900° to 1270°C are very well expressed by the empirical formula $x/(C-x) = A/(C-A) - Kt$. Where x is the amt. of contraction at time t , A the initial length of the specimen, C the final contraction after heating infinitely long at a constant temp., and K a constant. II-IV. *Endothermal and exothermal reaction.* Determination of the dehydration point of clay with a thermo-balance; the change of the microstructure of clay by heating. Conclusions of these expts. are: (a) The dehydration of the constitutional water of kaolinite takes place between 400° and 600°C; (b) the dissociation of kaolinite into aluminium silicate and free silica commences very probably at 650°C; (c) the internal change takes place between 900° and 1000°C and it is probably a polymerization of the dissociated aluminium silicate; (d) between 1200° and 1300°C, we have also another internal change, which may be taken as the result of recombination of free silica and aluminium silicate formerly dissociated at lower temp. V. *Microstructure of stone.* Experimenting with bulb glass, stones have been classified into 4 kinds: (a) Unfused quartz grains coming from pot mats; (b) ditto coming from glass batch; (c) clay subs. coming from pot material; and (d) insol. foreign mineral coming from pot mat. as well as glass batch. 78 microphotographs are given. S. K.

Constitution and microstructure of silica brick and chamotte block used in tank furnace. ZENIRO UNENO. Research Lab., Asahi Glass Co., *Rept.* 10, 67(1923).—I. *Silica brick.* Descriptions on the microstructure of typical Amer. ganister-quartzites as well as silica brick made in Amer. and Belgium are given. (1) Quartzites of

Manchuria and Korea. Chief kind of Dairen quartzite is bluish grey to greyish white in color and has glassy appearance; it consists of quartz-grains with diam. of 0.4–0.6 mm., which are cemented together with secondary quartz grains under 0.05 mm. in diam. White granular quartzite of the same district is more crushable and very fit for the manuf. of silica brick. Under microscope, its coarse grains are 0.6–0.4 mm. large and round in shape. In reddish brown quartzite of Ryutozan, Ryojun, grains of about 0.5 mm. size are cemented with secondary quartz, about 0.03 mm. in diam., and red limonite; its refractoriness is SK 32–33, while that of the Dairen quartzite is SK 33–34. Sandstone of Chinkaiwan, Korea, chiefly consisted of round grains, 0.3–0.1 mm. in diam., is used only as mortar mat. since it is too weak. (2) Japanese quartzites. Chief quartzite producing districts are (a) Watsukamura in Yamashiro, (b) Bungo, (c) Tamba and Tango, and (d) Tosa, Awa and Iyo. Thin sections of white Watsuka quartzite show no cementing matter, solely consisting of angular quartz-grains, which are 0.8–0.2 mm. in diam. and exhibit undulatory extinction. The grains easily come off in firing. Bungo quartzite of superior quality is a red rock, finely veined with white quartz. The red portion is a mixt. of very minute grains of quartz and tuff; the white veins consist of quartz grains, 0.5–0.05 mm. large. Analysis of the quartzite is: Silica 95.19, alumina 1.03, ferric oxide 3.13, lime trace and magnesia trace. Inferior kind of Bungo quartzite, entirely or mainly, consists of coarse quartz grains, varying from 2.0 to 0.6 mm. in size. Quartzites of Tamba, Tango, Tosa, Awa and Iyo resemble those of Bungo. (3) Microstructure of domestic silica brick which have been used in a tank furnace. Outer portion of 18" wall between ports, which has been used for 3 years, is compared with other portions with respect to chem., phys. and opt. properties.

| Samples | Silica | Alumina | Ferric oxide | Lime | Magnesia | Alkalies |
|-------------------|--------|---------|--------------|------|----------|----------|
| 0–5" from outside | 94.87 | 1.90 | 1.60 | 1.31 | 0.13 | 0.19 |
| 0–1" from inside | 94.02 | 1.97 | 2.00 | 1.20 | 0.02 | 0.79 |

Thin sections of portion, which were 1–3" from inside, rarely showed wedge-shaped twins of tridymite. The portion, 0–1" from inside, contd. the wedge-shaped twins and lath-like crystals of tridymite. Thin sections prepd. from the surface of an arch-brick in a part, which had been exposed to the highest temp. in the fur., were composed of polysynthetic twins of cristobalite, 0.50 mm. long and 0.25 mm. wide, and fork-like crystals of tridymite. II. *Chamotte tank-blocks*. Chem. compns., size of grains and micro-structures of foreign tank-blocks are described. (1) Tank-blocks made by the Asahi Glass Co. Detailed descriptions on raw mats., manuf., chem. compns. and micro-structure of tank-blocks made by the Company were given. (2) Micro-structure of tank-blocks which were made by the Asahi Glass Co. and have been used in flux-line of a tank-fur. Longitudinal sections of such blocks have shown 6 continuous layers as follows:

| | Outmost layer | Second layer | Third layer | Fourth layer | Fifth layer | Inmost layer |
|--------------|---------------------|-----------------|---------------------|---------------|-------------|---------------------|
| Colors | Light reddish brown | Yellowish brown | Brownish grey-black | Blackish grey | White | Brown (transparent) |
| Ig. loss | 0.27 | 0.21 | 0.27 | 0.22 | 0.27 | 0 |
| Silica | 61.94 | 61.78 | 63.96 | 63.76 | 65.34 | 58.10 |
| Alumina | 32.82 | 33.00 | 32.41 | 31.63 | 30.29 | 28.74 |
| Ferric oxide | 2.55 | 2.74 | 1.96 | 1.74 | 1.32 | 1.59 |
| Lime | 1.11 | 0.70 | 0.72 | 1.39 | 0.73 | 1.04 |
| Magnesia | 0.36 | 0.66 | 0.38 | 0.51 | 0.43 | 0.49 |
| Alkalies | 0.94 | 0.91 | 0.30 | 0.75 | 1.63 | 10.04 |

Thin sections of the 2nd layer indicated some evidences of slight softening in the block. Those of the 3rd layer contained numerous crystals of sillimanite, 0.04 mm. long. The crystals grew up to 0.1 mm. in the 4th layer. Thin sections of the 5th layer were full of sillimanite and glass, though some quartz grains were still observed; biggest crystals of sillimanite measured 0.85 mm. in length. Some quartz grains had wedge-shape twins of tridymite in their centers. The inmost layer was nothing but a glass.

S. K.

Special brick lines. XXI. ANON. *Brit. Clayworker*, 33, 231-2(1924).—The use of brick for iron and steel fur. ladles is discussed.

H. G. S.

The Derbyshire Silica Firebrick Co.'s Works. ANON. *Brit. Clayworker*, 33, 235(1924).

H. G. S.

Handling clay automatically. ANON. *Ceram. Ind.*, 3 [6], 392-4(1924).—The plant of the Illinois Clay Products Co. located near Joliet, Ill., and operating on the Goose Lake fire clay deposit is described. Four hundred tons of fire clay are ground and screened daily by 7 men. From 50 to 100 tons of lump clay per hour are fed to an 8½-ft. dry fan equipped with 6-T. mullers. From 35 to 40 T. of 15-mesh clay are passed through 60 sq. ft. of screening area per hr. One car of clay is loaded by one man in from 45 minutes to an hour. The plant also produces a 200-mesh product by washing. An elutriator type of classifier is used. The clay is then permitted to settle in a large tank after which it is filter pressed and dried, the capacity being 5 T. of dry product per hr.

P. D. H.

Chromite. ANON. *The Clayworker*, 82 [5], 431(1924).—The U. S. Geological Survey, Dept. of Mineral Resources of the U. S., has recently published statistics collected by EDWARD SAMPSON and H. M. MEYER, of the chromite used in the U. S. in 1923. Of our annual consumption of about 100,000 T., only a few hundred T. come from domestic sources. In the manuf. of chrome brick, the chromite is usually finely ground in a ball mill, tempered in a wet pan and dry pressed. The brick are usually dried in tunnel driers and fired in round down-draft kilns, boxed in with silica brick, to from cone 18 to 20, and slowly cooled. Because of their neutral character, chrome brick are commonly used as a parting between silica and magnesite brick. They are unattacked by iron oxide scale. The crushing strength and resist. to abrasion are low at high temps. They have poor resist. to spalling. Their fusion temp. ranges from 2050° to 2180°C.

P. D. H.

Bonding high temperature refractories. R. C. GOSREAU. *Chem. Met. Eng.*, 31, 696-8(1924).

H. H. S.

Effect of impurities in fireclays. C. E. BALES. *Brick and Clay Record*, 59, 723-5 (1921); *J. Inst. Metals*, 30, 699.—High-grade fire clays are those which have a chem. compn. approximating that of kaolin. B. discusses the effect of impurities. Excessive SiO₂ decreases the refractoriness and makes the finished product friable. Iron compds. act as fluxes, are coloring agents, and increase the shrinkage of clays. Ferrous Fe is extremely harmful. CaO acts as a flux, makes the brick friable (if in large lumps), and neutralizes the color produced by Fe compds. MgO acts as a flux, prevents warping, and forms a scum on the finished product. Na₂O and Mn are active fluxes. TiO₂ is a flux and acts as a coloring agent. Mn is a coloring agent. Carbonaceous matter is harmful, as it reduces Fe compds. to the ferrous condition. Excessive H₂O causes brick to crack and brings sol. salts to the surface of the brick.

H. G. (C. A.)

Observations on requirements of refractories for open hearth. F. W. DAVIS AND G. A. BOLE. *Trans. Am. Inst. Mining Met. Eng.*, No. 1312-S, 10 pp.(1924); cf. *C. A.*, 18, 739.—A general discussion.

C. H. K. (C. A.)

Materials for constructing vessels for very high temperatures. H. v. WARTENBERG. *Chem. App.*, 11, 129-30(1924).—A summary of the properties of graphite, ZrO₂, quartz

glass, hard porcelain, Pt, Pt-Ir (30%), Ir, W and Ta, with a table showing max. temps. for use, substances by which attacked, permeability to gases, etc. J. H. M. (C. A.)

Action of high temperatures on some refractory substances. CAMILLE MATIGNON. *Compt. rend.*, 177, 1290-3(1923).—The app. used was a C resistance tube-furnace, through which was maintained a current of pure N_2 . The samples were in the shape of pellets placed in the center of the furnace. Temps. were read by means of a calibrated Wanner pyrometer, and correction was made for absorption of radiation by the microscope cover-glass used as a window. 1. $Na_2O \cdot Al_2O_3$, made by heating Na_2CO_3 with slight excess of Al_2O_3 , m. 1650° . Aluminates richer in Na_2O lose Na_2O by dissoc. below 1650° . 2. *Zr silicate*. Crystd. Brazilian zircon did not melt at 2126° . SiO_2 vapors are evolved above 1800° . The residual zircon does not melt at 2300° . Estd. m. p. 2600° . There is a possibility that zircon might be heated to give ZrO_2 . 3. *Zircite*. The natural oxide did not melt at 1950° . 4. WO_3 is reduced under conditions of expt. to metal and carbide but does not melt. 5. AlN does not melt at 2200° . The crystd. form is only slowly attacked by O_2 at high temps. M. O. L. (C. A.)

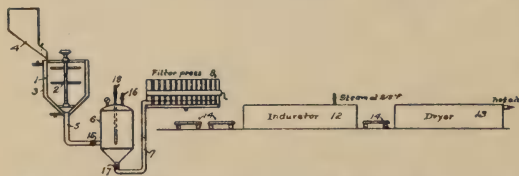
Some interesting properties of refractory materials. B. BOGITCH. *Rev. universelle mines*, 17, 65-80(1923).—A description of the chem. and phys. properties of refractory materials, including their chem. compn. in relation to their fusibility, their phys. properties as a function of temp., and dilatation and heat condy. as a cause of their slow destruction. C. C. D. (C. A.)

PATENTS

Machine for making molded shapes from refractory material. CHARLES L. NORTON. U. S. 1,523,830, Jan. 20, 1925. A mach. of the class described comprising automatically actuated means moving in timed relation for molding a plastic shape in upright position upon a mold-board normally disposed below a charge delivery device; for inverting the board with the shape thereon; for restoring the board to normal position; for ejecting the shape from the molding means; and for conveying the ejected shape away from the point of ejection. A mach. of the class described comprising a mold-board and a mold-box, and a power actuated shaft provided with means for moving the mold-board and mold-box in arcuate paths, and for moving the mold-box bodily in a rectilinear path. A mach. of the class described comprising an invertible mold-box, means for inverting it, a push-plate coöperable therewith, and means for positioning the push-plate over the inverted mold-box.

Highly-refractory article. HENRY H. BUCKMAN and GEORGE A. PRITCHARD. U. S. 1,521,749, Jan. 6, 1925. As a new article of manuf. a highly refrac. mat. permanently contg. carbon in its graphitic form, and also a chem. compd. of natural zircon.

Semi-refractory heat insulating material and method of making the same. CLARK S. TEITSWORTH. U. S. 1,520,893, Dec. 30, 1924. The method of making a heat insulating compn. which consists in subjecting a mixt. comprising diatomaceous earth and lime to the action of heat and agitation in the presence of water, then molding the mixt. to desired shape and subjecting the molded mat. to the



action of steam at substantially atmospheric pressure to indurate the material and subjecting the indurated mat. to a drying operation.

Porous insulating bricks. J. B. MACDERMOTT and D. A. McLAREN. *Brit.* 216,771, Oct. 13, 1923. A molded material for heat- and sound-insulating purposes is prepd. from a mixt. of black peat and diatomaceous earth, in the proportions, *e. g.*, of 1 and 3 parts, resp. The material is mixed with sufficient liquid to produce a plastic mass, molded, dried and heated to about $370-425^\circ$. (C. A.)

Terra Cotta

Terra cotta. C. W. HILL. *The Ceramist*, **4**, 363-70(1924).—A paper prep'd. for publication in the Industrial Directory of N. J. It is a brief history of the indus. The author gives also a very brief summary of the properties and advantages of the use, processes of manuf. and reference to particular examples of the type of construction.

C. W. P.

Manufacture of soft earthenware. F. BIGOT. *Rev. Mat. Constr. Trav. Pub.* **182**, 249-53B(1924).—Tableware of "faience tendre" manufactured at Varages of which (1) is a chem. anal. of the fired body made of clays such as (2), (3) and (4), sand as (5) and a pure limestone. While a white body is required, plastic clays are used in which the iron oxide content helps the fusion but does not interfere with the color. At 1000° the clays give products with low porosity. The sand (5) when fired to 1050° has a reddish color, indicating the high coloring power of iron oxide in the presence of excess silica. The limestone used is a relatively pure product and acts not only as a flux but also as a decolorizer, to maintain a white product. Magnesia and dolomite have also been used for the same purpose. To obtain 100 g. of the respective oxide, 178.5 g. of CaCO_3 or 210 g. of MgCO_3 are necessary, the loss of wt. being in the proportion of 1 to

| | (1) Fired tableware per cent | (2) Clay, per cent | (3) Clay, per cent | (4) Clay, per cent | (5) Sand, per cent | (6) Marl, per cent | (7) Clinker, per cent | (8) Dolomite, per cent |
|-------------------------|---------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|---------------------------------|
| SiO_2 | 52.05 | 45.00 | 52.30 | 57.60 | 93.60 | 42.00 | 55.00 | 0.90 |
| Al_2O_3 | 17.18 | 38.30 | 29.85 | 27.62 | 3.54 | 10.10 | 9.00 | 1.40 |
| Fe_2O_3 | 1.54 | 0.80 | 1.80 | 1.75 | 1.66 | 4.22 | | |
| TiO_2 | ... | ... | ... | 1.05 | ... | 0.18 | .... | .... |
| CaO | 27.06 | 1.40 | 1.60 | .... | 0.15 | 18.31 | 36.00 | 31.90 |
| MgO | | 1.08 | 0.40 | 0.13 | tr. | 3.52 | | 20.05 |
| Alkalis | 1.72 | 0.55 | 2.80 | 0.05 | .... | .... | .... | .... |
| Ign. loss | ... | 12.76 | 10.91 | 11.80 | 1.25 | (21.67) | .... | 46.70 |
| TOTAL | 99.55 | 99.89 | 99.66 | 100.00 | 100.20 | 100.00 | 100.00 | 100.95 |

| Batch comps. | (9) Per cent | (10) Per cent | (11) Per cent | (12) Per cent | (13) Per cent |
|-----------------------|-----------------|------------------|------------------|------------------|------------------|
| Clay (4) | 40 | 45 | 45 | 45 | .. |
| Clay (5) | .. | .. | .. | .. | 37.33 |
| Limestone (pure) | 35 | 40 | 32 | .. | .... |
| Marl (6) | .. | .. | .. | .. | 68.00 |
| Dolomite (8) | .. | .. | .. | 40 | 12.68 |
| Magnesium oxychloride | .. | .. | .. | .. | 5.0 |
| Sand (pure) | 10 | 15 | 23 | 10 | .... |
| Clinker (7) | 15 | .. | .. | .. | .... |
| TOTAL | 100 | 100 | 100 | 95 | 123.01 |

1.40. Hence the quantity of magnesia to be used is limited on account of the lack of cohesion created by the excessive porosity. To obtain similar fluxing action the magnesia mixt. must be fired to higher temps. than the lime body. In lab. expts. with dolomite B. made a tight body with compn. (12). Part of the dolomite may be substituted by a natural silicate of lime and magnesia, or by a "clinker" such as (7). Comps. (9), (10), (11) and (12) have been found to give satisfactory products. The biscuit is fired at cone 04a, and the glaze matured at cone 09a. In these comps. the sand and limestone were pure mats. With some marls the addition of magnesium oxychloride has been advantageous as a decolorizer due to the action of the chlorine. (13) is an

example of such a mixt. Although the iron oxide content is high the products have satisfactory color. The glazes contain either (1) Na_2O , PbO , Al_2O_3 , SiO_2 and B_2O_3 , with or without CaO , or (2) Na_2O , K_2O , CaO , MgO , Al_2O_3 , SiO_2 and B_2O_3 , a feldspathic glaze.

L. N.

Whiteware

Seven kilns do the work of nine. ANON. *Ceram. Ind.*, 3 [6], 374-9(1924).—The new plant of the Crescent China Co. at Alliance, Ohio, is fully described. The batches are weighed on a scale batch cart and delivered to double blungers, having a capacity of 6000 lbs. per 2 hrs. The slip is drawn off through a $1/4$ -mesh screen into an agitator having a capacity of 30,000 lbs. of body. From here the slip is run over a 110-mesh rotary decagon lawn, through a sluice contg. home-made electro-magnets, and over a 140-mesh rotary lawn running at 40 r. p. m. and into a fine agitator from which it is pumped to the presses equipped with No. 10 cloth at 85 lbs. press., 105 mins. being required to fill a press. The clay is then pugged twice in horizontal pugs and delivered to the jiggermen. Nuclay used for casting is weighed up in 3500 lb. batches, ground for 12 hrs., in a pebble mill, and stored in an agitator from which it is pumped to the individual casting barrels. Each jiggerman is equipped with a continuous drier operating at a temp. of 150°F through which the ware passes in 2 hrs. and 45 min. The sagger batch is aged 3 days and pugged once. The saggars are hand-made at the rate of 130 per 9 hrs. per man. There are 3 up-draft coal fired $8\frac{1}{2}$ -ft. bisque kilns each having a capacity of 2000 saggars and operating on a 7-day turnover. The ware is fired to cone 8. Veritas firing rings are also used. The dipping is done in 2 double automatic mangles operated at 135°F . There are 4— $16\frac{1}{2}$ -ft. oil fired glost kilns. The ware is fired to cone 4 in 26 hrs. The ware is decorated on 3 continuous "decal" mach. There are 6-coal fired decorating kilns each 18 ft. long 9 ft. high and 3 ft. wide with 6 fire boxes. The ware is fired at 1400°F in 11 hrs.

P. D. H.

Pinholes and some other things. HAROLD J. PLANT. *Pottery Gaz. and Glass Trade Rev.*, 49 [570], 1989-91(1924).—Pinholes were attributed to the following causes: (a) the imperfect prepn. of the body mats.; (b) imperfect blunging; (c) insufficient ag-ing; (d) a faulty pump, pumping air instead of clay; (e) bad pugging; (f) deleterious press cloths; (g) dust on the molds; (h) perished molds; (i) too much water used by the potter; (j) casting molds being too wet, too dry or too hot; (k) bad firing; and (l) faulty glaze mixt.

P. D. H.

Porcelain. ANON. *Brit. Clayworker*, 33, 234(1924).—Present-day methods of mfg. porcelain are described.

H. G. S.

Effects of flints on the thermal expansions of some whiteware bodies. W. L. SHEARER. *The Ceramist*, 4, 143-65(1924).—An investigation of the effect of (a) quartz rock; (b) quartz sand; (c) quartz sand rock; (d) flint rock; (e) cryptocryst. quartz (chert); (f) French pebbles; (g) French pebbles; (h) quartz sand-rock, finely ground; (i) cristobalite from a fired silica brick upon semi-porcelain vitreous china and sanitary bodies. These bodies when fired were studied with reference to their thermal expansion dunting and quenching conduct. In the semi-porcelain body, the (a), (b), and (c) had practically identical influence; (h) showed a consistently higher coeff. The cristobalite (i) gave a more rapid expansion up to 250° and slower thereafter. A similar body prepd. with cryptocryst. mat., French and domestic, showed but slight difference between the same. A comparison of the 3 bodies using (b) shows that the vitreous body has a uniformly slightly higher rate than the others. At 400° the semi-porcelain body begins to show an accelerated rate and it overtakes the vitreous body at about 550° . A comparison of the effect of ground sand, rock flint, cryptocryst. quartz and French flint in a vitreous body shows a slightly increased expansion up to 250° in the case of the ad-

dition of French flint which is attributed to the development of cristobalite. The same body shows a slightly diminished expansion at 600° . The other bodies are quite similar in their conduct. The addn. of (b), (c), (d), (e), and (g) to sanitary ware body showed little differences in the expansion conduct. Dunting tests were conducted by means of cups which were htd. in a fur. and allowed to cool to room temps. Failure was attributed to the inversion of α quartz to the β quartz. Dunting is dependent upon the rate of cooling. It is difficult to produce dunting in the semi-porcelain body containing cristobalite. Bodies contg. cryptocryst. quartz or true flints are more resistant to dunting than the bodies containing quartz. A finely ground "flint" produces a body more resistant to dunting. These conclusions are restricted to vitreous china and sanitary ware. Porous ware seems to have the same tendency to dunt as the more vitreous wares. Quenching tests were conducted by htg. disks measuring $3\frac{1}{2}$ " in diam. x $\frac{1}{2}$ " thick to uniform temp. of 200° and plunging them into water at room temp. Semi-porcelain bodies are more resistant to failure than the sanitary or vitreous china. The various siliceous mats. may be listed in the following order with respect to their effect in bodies on resist. to quenching, the first named giving the greatest resist.: sand (b), rock (a), rock sand (c), French pebbles (f), ditto (g), cryptocryst. (d). There is no very sharp line of demarcation. In general bodies contg. regular quartz flints are better than those contg. cryptocryst. flints.

C. W. P.

Practical aspects of the casting of heavy vitrified clay products. C. C. TREISCHEL. *The Ceramist*, 4, 204-10(1924).—Amount of ball clay used varies from 5-25 per cent depending upon their characteristics. It is good practice to use two kinds. For heavy vitreous wares, Am. ball clays are equal if not superior to imported. A factory method of testing the colloidal content is to slake 100 grams of ball clay with 200 grams of water and let stand 48 hrs. in long narrow tube. The degree of turbidity is index of colloidal content. Substitution of Am. secondary kaolin, such as those from So. Car., Ga. and Fla., for English kaolin will cause trouble. Am. clays may be used but the bodies are characteristically different. Casting slips may be either premixed or raw. The first are blunged and filter pressed, and are added to the water and electrolytes. The raw slips are prepared by mixing the body mats., salts and water. In this latter case the general practice is to mix in a ball mill. Premixing has the disadvantage of removing certain organic compounds which are deflocculating agents. Otherwise, neither method has any advantages. Slips used for core casting should weigh 30 ozs. to the pint and more. Slips for drain casting should weigh about 28 ozs. to the pint. The author recommends adding $\frac{3}{4}$ of the necessary amt. of electrolytes to the water in the blunger or ball mill. To this is added the body materials and finally the remainder of the salts. Care must be exercised in testing the weight and viscosity of the slips. The storage of casting slips is important because it affords an opportunity to free the slip from as much air as possible. The proper construction of the blades of the agitator as well as suitable speed accomplish this result. A thickening of the slip on standing is attributed to adsorption of the salts by colloidal mat.

C. W. P.

Practical aspects of casting heavy vitrified white ware products. (Continued.) C. C. TREISCHEL. *The Ceramist*, 4, 283-6(1924).—*Mold and mold-making.* The body of the mold, for use in casting, should be more dense than the core. Sharp corners and unequal thicknesses cause sticking and mold cracking. Molds may be classified as (a) molds for core casting, (b) molds for draining and (1) open-top and (2) closed-top. The closed-top mold requires the use of a funnel for introducing the slip and laminations formed at that point. Slip distributed by continuous pumping will probably fluctuate in viscosity due to heat generated by friction. Author unable to state whether or not this is objectionable. To avoid sticking of the body to cores the following methods are used: (a) wrapping the core in cheese cloth, (b) dusting the core with talc, flint, whiting

or dry body, (c) the admission of air under pressure through the plaster cores. The assembling or "sticking up" to form the completed piece may be done with (a) water, (b) slip, (c) wads, (d) glaze. C. W. P.

Manufacture of electrical porcelain at the plant of Pass and Seymour. R. F. SHERWOOD. *The Ceramist*, **5**, 74-91(1924).—A description of the operation employed in the manuf. of low tension elec. insulators which does not differ materially from the processes customarily used. C. W. P.

Sanitary ware industry in America, historical and statistical with a brief reference to the technology. LEROY H. MINTON. *The Ceramist*, **4**, 337-50(1924). C. W. P.

Permanent filter mats in Gooch crucibles. O. R. SWEENEY AND G. N. QUAM. *J. Am. Chem. Soc.*, **46**, 958-60(1924).—Porcelain from a crucible of the same brand as that used for the test was crushed and graded into Grades I, through 130-mesh; II, through 64-mesh; III, through 0.5 mm.; and IV, through 1.0 mm. Grade IV was used to fill perforations in the crucible, and then a mixt. of Grades III, II and I in the proportion of 2:2:3 was added to a depth of 6 to 7 mm., treated with 0.5 *N* KOH soln. satd. with $\text{Ca}(\text{OH})_2$, dried at 110° for 10 hrs., heated in full flame of a Meker burner 2 to 8 hrs., and then extd. with 50 cc. 6 *N* HCl, washed, heated until no Na flame was visible, extd. with HCl (sp. gr. 1.2), again heated, treated with aqua regia repeatedly, dried at 110° and weighed. Such crucibles permitted 1.45-2.94 cc. of H_2O per min. to flow through (when crucible was kept filled with H_2O), and removed BaSO_4 and AgCl ppts. satisfactorily. Superiority of porous crucibles is claimed. W. C. E. (C. A.)

The properties of high tension (porcelain) insulators. M. F. DAHL. *Electro-techn. Maschinenbau*, **42**, 361-6(1924). C. F. G. (C. A.)

Equipment and Apparatus

A recording apparatus for the measurement of the expansion of glass. A. ARNULF. *Sci. Abstr.*, **27** [11], 995(1924); *Rev. d'Optique*, **3**, 270-6, June, 1924.—The paper gives details of an app. for obtaining a continuous record of the expansion of samples of glass of thin dimensions. An interference method is employed, derived from that of FIZEAU, and as the expansion is measured directly, the need for a standard body for purposes of comparison is dispensed with. The displacements of Newton's rings, formed between two surfaces, one spherical and the other plane, sepd. by an annular wedge of the specimen under examination, are registered and then counted. The registration of the displacements of the rings is accomplished by projecting them on to a slit, placed initially over their center, and across which a photographic plate is drawn in a direction perpendicular to the length of the slit. Initially, the record on the plate consists of parallel lines, but as the temp. is raised the rings are displaced, the lines become curved, and eventually meet at the point of disappearance. These points are well marked on the record and by detg. the number of such points for a given rise of temp., the exact expansion can be detd. The app. is enclosed in a box around which a htg. coil is wound. By passing a current through this coil temps. up to 300°C are obtained. A mercury lamp furnishes the source of monochromatic light. The paper concludes with a detailed description of the app., and directions, precautions, etc., for its use. A sample can be completely examd. in half an hour. A. F. G.

Double mirror dilatometer for low-temperature work. G. BORELIUS AND C. H. JOHANSSON. *Sci. Abstr.*, **27** [11], 995(1924); *Ann. D. Physik*, **75** [1], 23-36 (1924).—A brass plate resting on two supports has a pair of parallel mirrors fixed one at either end. The specimen under test is fastened rigidly at its upper end while its lower end is attached to the center of the brass plate. As the specimen expands or contracts, this plate is bent and the amt. of bending is detd. in the usual way using a beam of light reflected from the mirrors in turn. The variation of angle between the

mirrors depends only on their distance apart and the amt. of bending of the plate. The whole app. is enclosed in a chamber and the temp. is varied by the use of liquid air and measd. by a platinum thermometer. The range is down to about -200°C . Some results are given for specially pure copper rods and also for crystals of zinc and cadmium in various directions relative to the axes.

A. F. G.

Diamond fishtail bits. ANON. *The Clay Worker*, **82** [3], 223(1924).—The bits are made of special alloy steel, heat treated and give several times the service of the old blacksmith bit. They range in diam. from $1\frac{1}{2}$ in. to $3\frac{3}{4}$ in. They cost but a few cents and can be attached to the old auger by simply flattening the end of the auger and drilling a hole for the bolt. The speed of shot hole drilling is doubled. They are manufactured and distributed by the Jos. McLaughlin Co. of Joliet, Ill. P. D. H.

Ball and tube mill liners. WILLIAM T. W. MILLER. *Eng. and Min. Jour.-Press* **118** [16], 613-7(1924).—A discussion is given on the linings used in ball and tube mills. In the early days flint pebbles were largely used as the grinding media and the lining of the mill was also made of silica in either natural or artificial blocks. In some industries, as the pottery trade, the silex lining is still in use but such instances are now exceptional, and the use of alloy steel or iron linings has become the general practice. A. H. K.

Domestic tube mill lining successfully meets foreign competition. W. M. WEIGEL. *Eng. and Min. Jour.-Press*, **118** [24], 925-8(1924).—A detailed discussion is given on the mining of quartzite rock at Jasper, Minn. Lining blocks and grinding pebbles are produced. In mining and cement industries, iron and alloy steel linings and balls have largely replaced flint linings; but in the grinding of silica, feldspar, whiting and glazes for the ceramic industry, flint or porcelain liners are necessary. The chemical analysis and the physical tests made on the Jasper quartzite are as follows:

| | |
|--|--------|
| Silica as quartz..... | 94.00% |
| Silicates of alumina and potash..... | 2.40% |
| Hydrous silicate of lime..... | 2.00% |
| Iron oxide..... | 1.60% |
| Crushing strength, pounds per square inch..... | 45,300 |
| Abrasion by standard rattler test..... | 4.6 % |
| Toughness, French coefficient..... | 21.5 % |

A. H. K.

Calorimetric apparatus for the measurement of reaction heats at high temperatures. J. D. DAVIS. *Ind. Eng. Chem.*, **16**, 726-30(1924).—The app. consists of an adiabatic twin calorimeter of the const.-vol. type provided with means of electrically heating the substance under test in steel bombs similar to those used in combustion calorimetry. The reaction is carried out in one bomb while its twin receives the same amt. of elec. energy. The capacities of the 2 calorimeters are equal; hence the reaction heat sought is the difference between heat quantities developed in the two as measured calorimetrically. Calorimetric precision realized was 3.6% of the heat quantity measured or 0.013% of the total involved, which last includes the heat used electrically. Results for the heat of carbonization of coal are given and the theory of the twin calorimeter is discussed.

J. D. D. (C. A.)

Design and operation of ball and pebble mills. E. W. LAWLER. *Chem. Met. Eng.*, **30**, 517-8(1924).—The main factors involved in non-continuous ball or pebble mills are: for mill design—shape, proportions, lining and discharge openings; operating factors, size of feed, feed load, kind, shape, size and load of balls or grinding media, wet or dry grinding, speed of mill and time of grind. A pebble mill is a pulverizer rather than a crusher. Pulverizing can best be done by attrition instead of

by impact. The time of grinding is detd. best by counting revolutions rather than by actual time.

W. H. B. (C. A.)

Supplemental theory of fine grinding. A. T. FRY. *Chem. Eng. Mining Rev.*, **15**, 388-94(1923).—In grinding material in a ball mill it was discovered that at a certain point of time a very marked loss in efficiency occurred. This is intimately related to the angle of nip (approximately 30°), as in the case of roll crushing. For a given diam. of flint one can calc. the diam. (d) of the contact area which would result were the feed composed of a particular size (P), and for a given number of flints of a certain av. diam. the available contact area for crushing depends on the size of the feed particles available up to the max. permitted by the angle of nip. Thus, the max. diam. of particle nipped (angle of nip = 30°), $P = 0.07R$, where R = radius of the flint; and the diam. of the contact area, $d = 2(\sqrt{RP + (P^2/4)} - 0.00907R)$. As the contact area is diminished the energy of impact will be concd. on an area too small to hold sufficient rock to absorb the energy efficiently in the resulting comminution; therefore, the smallest effective flints should be used, and still smaller steel balls may be preferable. Exptl. results are reported showing the relationships among above factors, energy consumption, etc.

W. C. E. (C. A.)

The selection and care of pyrometers. J. W. CONZELMAN. *Power*, **58**, 644-6 (1923).—Details are given for the making and use of thermocouples. D. B. D. (C. A.)

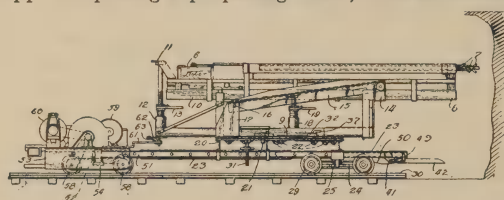
High-frequency electric induction furnace. R. DUFOUR. *Compt. rend.*, **176**, 828-30(1923).—The uses and advantages of high-frequency induction furnaces are briefly discussed.

C. C. V. V. (C. A.)

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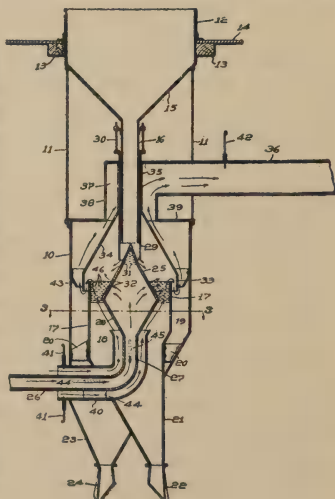
Mining machine. RALPH E. NOBLE. U. S. 1,521,788, Jan. 6, 1925. A mining app. comprising a propelling truck, a trailer truck, a vehicle frame pivotally mounted

on said trailer truck and connected to the propelling truck by a swivel connection, a turn-table on said vehicle frame, and a mining mach. adjustably mounted on said turn-table.



Pneumatic classifier. ALBERT H. STEBBINS. U. S. 1,522,151,

Jan. 6, 1925. A pneumatic classifier, comprising, in combination, a closed casing, an annular segg. wall disposed centrally within said casing and extending upwardly therein to form an inner and an outer chamber within the casing, a second annular wall within the casing extending downwardly in spaced overlapping relation about the upper end of the separating wall, an air conduit extending upwardly within the inner chamber, an upwardly extending cone within the inner chamber supported over said conduit so that mats. sliding down the walls of the cone will not enter the conduit, means for delivering mats. to be treated to the cone, and means for exhausting air from the upper portion of the casing about said second wall to produce air currents that rise within the inner chamber and pass upwardly over the end of the segg. wall and downwardly about the end of the second wall to remove the lighter particles from the heavier particles.



Kilns, Furnaces, Fuels and Combustion

Magnetic recovery of combustible in boiler plant refuse. RUDOLPH KUDLICH. *Jour. Franklin Inst.*, **198** [6], 835-6(1924).—The amt. of unconsumed combustible in boiler refuse may range from a few per cent to as high as 40 to 50%. Recovery on the magnetic principle has proved satisfactory. Tests reported by a German firm using a magnetic type separator showed recoveries up to 87% of the combustible in the refuse. From a standard magnetic separator an American firm was able to recover approx. 50% of the combustible.

A. H. K.

The tunnel kiln. ANON. *Brick and Clay Rec.*, **66** [1], 22-36(1925); and *Ceramic Industry*, **4** (1), 38-52(1925).—These articles are practically identical with the exception that the article in *Brick and Clay Record* contains, in addition, a section on the history of the tunnel kiln, both foreign and domestic, together with a partial bibliography on tunnel kiln. A description of the different types of tunnel kilns, the advantages and disadvantages, the principles of opern., the operg. information on 20 kilns now being used and a list of practically all of the tunnel kilns in the country, are thoroughly covered. *It is the most complete treatise on the subject of tunnel kilns that has ever been presented.*

P. D. H.

New kiln proves fuel saver. ANON. *Ceram. Ind.*, **3** [6], 386-7(1924).—The kiln described is one recently installed by the A. P. Green Fire Brick Co. of Mexico, Mo. The kiln is of the rectangular down-draft type with a flat crown. The dimensions are 24 x 36 x 9 ft. from the floor to the crown. The crown is of the Liptak single suspension type, such as is extensively used in boiler arches. Twelve 15-inch "I" beams, which rest on the side walls of the kiln, support the entire crown. The crown blocks were made with a long neck so as to permit of 4½ in. of insulation. There are 8 vent holes 12 in. square in the crown, to facilitate cooling. The side wall construction consists of a 13-in. lining with 4½ in. of insulation and facing. The whole structure is covered with a galvanized tin roof. There are six 24-in. inclined grate bar fur. on either side and two 15-in. fur. of the same type at either end, located on either side of the wicket. The ratio of grate area to floor area is 1 to 11 and has been found ample. The ironing is composed of four 6-inch "I" beams for buckstays at either side and at either end of the kiln with the usual tie rods. There is a 4½ in. continuous bag wall which is 9 in. from the kiln wall and extends to within 3 ft. of the crown. The brick in the bag wall are placed "checker" fashion with approx. 6 sq. in. between them. Behind the bag walls and at either side of each fur. are supporting piers, built in open style, which tie the bag wall to the main kiln wall. This construction affords a uniform draft through the kiln as evidenced by the even ht. distribution from top to bottom. The draft during the water-smoking period is good and the kiln is fired off in less time and with less coal than a round kiln of equal capacity. The quality of ware is exceptionally good. The other advantages of this type of kiln are: greater setting capacity, elimination of crown thrust, crown repairs facilitated, more effective combustion of gases from fur., and the ease with which the crown can be protected by a roof.

P. D. H.

Ash softening temperature and clinkering of coals in a boiler furnace. J. F. BARKLEY. Repts. of Investigations, *Bur. Mines*, Serial No. 2630(1924).—A table is given showing the chem. anal., ash softening temps., softening intervals, flow intervals and fur. conditions in connection with a number of coal samples. There appears to be a general relationship between the ash softening temps. and the clinkering in the fur.

P. D. H.

Calculation of equivalent orifice for kiln drafts. PIERRE DE GROOTE. *Rev. Mat. Constr. Trav. Pub.*, **181**, 209-13B(1924).—From the consumption of coal fuel per hr., knowing the ash and CO₂ content, Q the flow of gas in cu. m. per sec. can be calcd. for t° the av. temp. of the gas in the kiln, obtained by measg. the temp. of the gas at the

outlet of the fire-box and at the stack. With the measured quantity r the resist. of the kiln in mm. of water obtained by a pitot tube in the draft system, the following relationship exists between the terms:

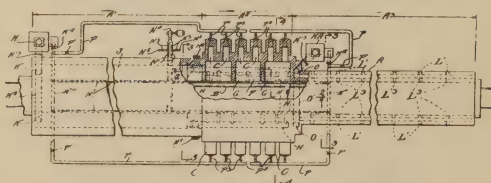
$$a = \frac{Q}{0.65 \sqrt{15.17 \frac{r}{1.04} \left(1 + \frac{t}{273}\right)}}$$

where a is the equiv. orifice of the kiln in sq. m., that is, an orifice which gives the same resist. to the vol. of heated gas as exists in the kiln. The term r includes a correction, namely the addition of 1 mm. for each m. of height the crown of the kiln is above the surface of the grate. A graphic chart is given whereby a or Q is detd. by inspection from values of r and t . L. N.

A study of the destructive distillation of coal. EDWARD VICTOR EVANS. *Jour. Royal Soc. Arts*, 72 [3749, 3750, 3751], 767-82, 785-801, 805-18(1924).—*Lecture 1*. A discussion on the efficiency of high and low temp. carbonization and the thermal value of the products. The design of retorts is briefly considered. Vol. and calorific curves are given showing the effect of high vacuum and the rate of gas production. The effect of leaks in retorts is also shown by gas curves. *Lecture 2* brought out the fact that rapid carbonization is essential to the best yields of gaseous therms. This result is considered due to reason that the tar is subjected to a higher degree of cracking with the result that gas is produced at the expense of tar. *Lecture 3* considers the question of how to modify the carbonizing process in order to increase the rate of heat transmission not only through the retort walls but also through the charge itself. High heat transmission through the retort walls is obtained by the use of carborundum. High heat transmission through the charge was obtained by mixing coke with the coal. A study was made of the carbonization of briquetted coal and the results showed a greater production of gas per ton of coal and the resulting coke was found to burn to an ash practically free from carbon. E. J. T.

PATENTS

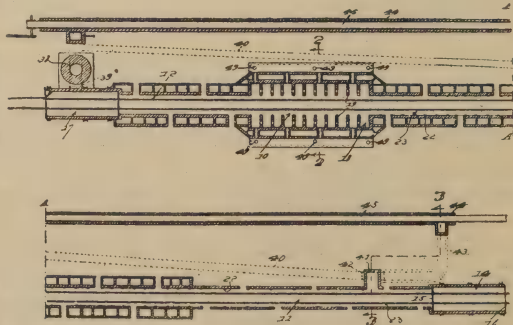
Combination open and muffle kiln and method of operating the same. HARRY M. ROBERTSON. U. S. 1,521,392, Dec. 30, 1924.



which further heat is supplied to the ware and the latter is subjected to a non-oxidizing atmosphere by contact with hot gases passed into the kiln chamber at its top and withdrawn from the kiln chamber at its bottom.

Combined brick kiln and drier. NICHOLAS U. LUDWIG. U. S. 1,523,485, Jan. 20, 1925. In a kiln for firing brick, a tunnel, firing chambers on each side of the tunnel, superimposed checkered

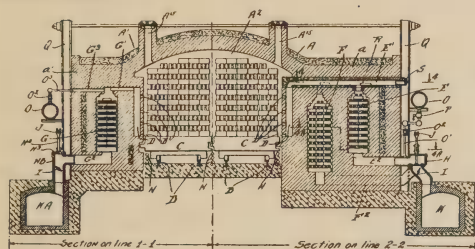
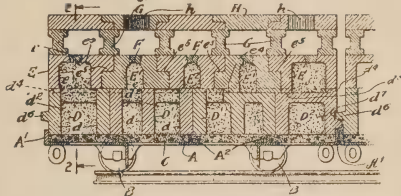
The method of treating ceram. ware which consists in gradually heating the ware to a high temp. by passing the ware through a continuous tunnel kiln comprising a htg. up zone in which the ware receives the major portion of its heating and in which an oxidizing atmosphere is maintained, and a successive kiln zone in



brick in each chamber, the inner edges of the courses of the brick being stepped outwardly toward the top, the flues formed by the checkered arrangement of the brick being gradually higher from the inner edge to the outer wall of the said chamber, and means for generating heat under the checkered structure.

Kiln car. PHILIP D'H. DRESSLER.

U. S. 1,521,216, Dec. 30, 1924. That the refrac. blocks composing the refrac. body portion of the car are much larger than have heretofore been employed in the construction of such car bodies. As a matter of fact the blocks in the construction shown, are as large as it is ordinarily feasible to make them.



Kiln and method of operating same. LOUIS WILPUTTE. U. S. 1,522,166, Jan. 6, 1925. The method which consists in causing a gaseous thermal agent to move through a tunnel kiln chamber with a direction of flow which at all points in the kiln chamber is approx. horizontal and transverse to the length of the kiln.

Geology

The geology of the clay deposits with particular reference to those in New Jersey. W. W. TWICHELL. *The Ceramist*, **4**, 211-28(1924).—The formation of clays and distribution and geological history of the chief clay deposits in N. J. C. W. P.

Marketing of fullers' earth. ARTHUR B. PARSONS. *Eng. and Min. Jour.-Press*, **118** [20], 771-3(1924).—The properties, production and composition of fullers' earth are discussed. The value of this earth is due to its unusual proficiency in absorbing basic coloring matter, from oils of vegetable, animal and mineral origin. The U. S. virtually has a monopoly of the production of this earth. Further progress will depend largely on improvements in technical control of production and prepn. A. H. K.

Visit to the kaolin quarries of the region d'Echassières, Allier (France). ANON. *Rev. Mat. Constr. Trav. Pub.*, **181**, 220-7B(1924).—An interesting article written by the ceram. students of Vierzon-Ville, of their trip to the kaolin quarries. It includes a map of the district, general plans and layout of the three different quarries. At the Beauvoir quarry, kaolin is worked with pick and shovel, whereas at Chaunes Molles and Colettes the kaolin is washed down by heavy streams of water. The kaolin was produced by the weathering of granite contg. quartz, feldspar and white mica. It is used in the manuf. of porcelain, faience, paper, etc. The usual methods of settling out the coarse and fine sand, bluing with methylene blue, concentrating and drying of the slip are also given. At Beauvoir the "rose" quarry is noted for its content of cassiterite, occurring in the sand. The cassiterite is concd. from the quartz by means of vibrating tables, and put on the market. Before the war tantalum-niobate of iron and manganese were concd. from the same source, and used as a raw mat. for tantalum filaments. L. N.

Chemistry and Physics

Properties of powders. Influence of velocity of compression on apparent compressibility. Part VIII. E. E. WALKER. *Sci. Abstr.*, **27** [11], 946(1924). (Trans.

Faraday Soc., 19, 614-620; *Disc.*, 620-2, March, 1924.)—When a powder is compressed in a cylinder by a constant load the velocity of compression is very high at first and then rapidly falls off. The relationship between the length of time for which the load has been applied and the velocity with which compression takes place is calculated from the equation

$$\text{Velocity of compression} = -\frac{dV}{dt} = K't^{-0.9}$$

Where V is vol. ratio, t the load, and K' the velocity coeff. The author calculates the relationship between the resist. which a powder offers to compression by impact of known velocity (R_i) and its resistance to a static load of known duration (R_p) from the equation $\log_{10} \frac{R_i}{R_p} = 10 \frac{K'}{K} \left\{ t \frac{1}{10} - \left(\frac{K'Q}{5v} \right) \frac{1}{9} \right\}$ where v = impact velocity of falling weight in cm./sec., Q = quantity of powder in cu. cm., and gives the results in a table. The case of powdered ammonium nitrate is fully discussed, and figures are given to demonstrate that it is quite liable to shrink under the influence of prolonged external pressure and when acted upon by capillary forces. In the *Discussion*, E. P. PERMAN states that as a result of expts. he found the following: (1) No moisture, no shrinkage; (2) rapid increase of shrinkage with increase of moisture; (3) the greater the soly., the greater the shrinkage. A. F. G.

Thermoelectric investigation of nickel alloys. W. ROHN. *Sci. Abstr.*, 27 [11], 1013(1924). (*Zeits. f. Metallkunde*, 16, 297-300, Aug., 1924).—The object of this investigation was to obtain a thermocouple suitable for commercial use up to temps. in the neighborhood of 1200°C. The mats. for such a couple should be cheap, durable, and the thermoelec. force should be reasonably high so as to avoid measg. instruments of greater sensitivity. With this object in view, an investigation of the variation of the thermoelec. force of the metals Ni, Co, Al, Mg, Fe, Ta, Au, Cu, Ag, Mo, and W with Pt as the other element of the couple was first carried out over the range of 0-1200°C. The results are represented graphically in the paper, and it is concluded that Ni is the most suitable metal to employ as base for an alloy. Measurements were then made of the thermoelec. force, over the same temp. range, of Pt with binary alloys of Ni. The alloys used were Ni with 5% of Al, Mn, Ti, Ta, Zr, W, Mo, Cr, and V, and 10% of Cu, Co, Fe, W, Cr, Mo, and V. The data are represented graphically. From these curves it is deduced that combinations of Ni with Ni-Al or Ni-Cu or Ni-Fe might be used for ranges beyond 500°. For wider ranges combinations of Ni-Va, Ni-Cr, Ni-Mo or Ni-W, with either pure Ni or Ni-Al or Ni-Cu would be suitable. Va is excluded on account of the technical difficulty of obtaining it sufficiently pure, and Ni-Al alloys with more than 5% Al are difficult to prepare. Then follows an investigation of the electromotive force of couples formed of Ni with 4, 8, 10 or 16 parts of Cr, 4, 8, 10, 12, 16 or 20 parts of Mo or W, and 10, 30, 50 or 70 parts by weight of Cu against pure Pt. From the curves coördinating these data it is inferred that suitable couples would be Ni-Mo (16% Mo) against Ni-Cu (Cu 50%). No. 1 in figure. Oxidation, however, sets in rapidly beyond 800°C. No. 2 represents Ni-Cr (9.5% Cr) against Ni. No. 3 (full line) is the usual Pt-Pt-Rh couple, and the broken line 4 is a combination of two Ni-Cr alloys giving almost the same thermoelectric force. A. F. G.

Quantitative analysis of glass. JUSEI SUGIE AND OTOJI HATAYAMA. The Osaka Indus. Lab., *Bull.* 5 [3], 22 pp.(1924).—Methods of analyzing ordinary crown, borosilicate crown, barium crown, ordinary flint and barium flint are described in detail and the authors propose them as the standard methods in the country. S. K.

Preparation of titanium oxide and its refining. TAMAKI MATSUBARA. The Osaka Industrial Laboratory, *Bull.* 4 [13], 16 pp.(1923).—Recently, a titanium ore was found

in Korea. An analysis is: Titanium oxide 25.90, silica 4.58, ferric oxide 58.85, alumina 1.10, lime 4.08 and magnesia 3.60. Titanium oxide was prepd. by the known method, in which titanium-bearing ores are decomposed with conc. sulphuric acid. The results indicate that the ore must be ground as finely as possible, and also that too much excess of sulphuric acid reduces the yield of titanic acid. Various processes of refining the crude oxide have been experimented. Dehydration of refined titanic acid at temp. over 400°C is injurious, since yellowish tints are produced. S. K.

Absorption of H₂S from gas. ANON. *Chem. Trade Jour. and Chem. Eng.*, Sept. 19, 1924.—Dry purification by hydrated iron oxide used with a liquid process which employs a dil. soln. of sodium carbonate. The H₂S is removed from the soda soln. by aeration and is then used over again. The liquid process may be used for complete purification but is usually used to remove 85 to 90% of the H₂S and the remainder taken out by iron oxide catch boxes. The process also removes 90% of the HCN. E. J. T.

Colloid chemistry. ERICK RIDEAL. *J. Roy. Soc. Arts*, 72 [3752, 3753, 3754], 830-6, 838-44, 849-54(1924).—Three lectures on colloid chemistry. *Lecture 1* deals with the phenomena of adsorption, surface tension and catalysis. *Lecture 2* is devoted to the consideration of the suspension colloids in which a solid phase is finely dispersed in either a liquid or gaseous dispersion medium forming sols and smokes, respectively, and the difference in the properties of such a disperse system from the solid mat. one due to the operation of surface forces. *Lecture 3* deals with emulsions and gels. A great number of tech. and indus. applications are cited in all the lectures. E. J. T.

Critical studies on methods of analysis—XII. Boron. LEON A. CONGDON AND J. M. Rosso. (Contribution from the Dept. of Chemistry, Syracuse University.) *Chem. News*, 129, 3365(1924).—A comparative study of different methods for the detn. of boron. The sample used with all methods was c. p. boric acid contg. a trace of sodium. The study of these methods for boric acid shows that their accuracy can be classified as follows, the most accurate coming first: (1) DUNSTAN's volumetric neutralization process with addition of glycerol; (2) GOOCH's distillation gravimetric CA₃(BO₃)₂ method; (3) ASHMAN's distillation gravimetric phosphate procedure; 4th, DITTE's gravimetric CA₃(BO₃)₂ method. Dunstan's method is the quickest as well as the most accurate. E. J. T.

Elementary science in relation to clayworking. VI. ANON. *Brit. Clayworker*, 33, 225-6(1924).—The detn. of lime in clays is described. H. G. S.

Separation of molybdic and tungstic acids. I. KOPPEL. *Chem. Zeit.*, 48, 801-2 (1924); *J. Soc. Chem. Ind.*, 43B, 1030(1924).—The alkaline soln. contg. molybdate and tungstate is neutralized with formic acid and treated with a few cc. of amm. sulphide soln. The liquid is diluted to 100 cc., 5 cc. of strong formic acid are added, and the mixt. is htd. until molybdenum sulphide coagulates and settles. The filtered ppt. is washed with dilute formic acid and gently calcined to oxide. The filtrate is evaptd. with H₂SO₄ and tungstic acid pptd. by hydrolysis. H. H. S.

Binary system Na₂O.SiO₂-SiO₂. G. W. MOREY AND N. L. BOWEN. *J. Phys. Chem.*, 28, 1167-79(1924). H. H. S.

New reactions for the detection of ruthenium and osmium. L. WÖHLER AND L. METZ. *Z. anorg. Chem.*, 138, 368(1924); *Jour. Soc. Chem. Ind.*, 43B, 998(1924).—Thiocarbanilide and HCl give blue-green with Ru, and red with Os solns. Both colors can be extracted with ether, and are delicate to 3 in 10 million parts. H. H. S.

Sodium alizarate and alumina. F. S. WILLIAMSON. *J. Phys. Chem.*, 28, 891-2 (1924).—Hydrous Al(OH)₃ and Na or NH₄ alizarate when mixed give an adsorption complex and not a definite Al alizarate because no base is liberated in the reaction and the nature of the product formed varies with the conditions of the expt. A. G. (C. A.)

Modification of the Grosvenor humidity chart. G. C. GREENFIELD. *J. Soc.*

Chem. Ind., **43**, 9-10T(1924).—Because of changes in vol. with temp., relative humidity, as commonly used, is not on a const. basis. GROSVENOR's humidity is defined as lbs. H_2O vapor per lb. dry air. This is directly comparable but applies to air only. Greenfield's modification expresses humidity as lbs. H_2O vapor per lb.-mol. of dry gas. This eliminates the former's method requiring gas analysis or mol. wt. detn., and applies to all gases. The data given are important in air-conditioning, drying, and cooling problems involving heat transfer. Definitions and a humidity chart for air are given.

A. R. A. (C. A.)

Effect of the concentration of colloidal clay upon its hydrogen-ion concentration. RICHARD BRADFIELD. *J. Phys. Chem.*, **28**, 170-5(1924).—A fresh acid clay soil was churned with distd. water, allowed to settle and the muddy suspension was centrifuged several times. From the clear centrifuged soln. colloidal material was obtained by the prolonged application of high centrifugal force. This colloidal material was dild. with water until at a concn. of 12.8% it became a thick sirup. This soln. and more dil. solns. were examd., for their p_H values by the potentiometer method. The relation between the concn. of an acid colloidal clay and its H-ion concn. is practically linear at higher diln. (0-0.4%), exponential at intermediate dilns. (0.49-3.5%) and practically const. at higher concns. (3.5-12.8%). The curve of the acid colloidal clay and that of AcOH are so similar in every respect that it seems highly improbable that the acidity in the case of the former is due to the preferential adsorption of the OH-ion and in the case of the latter to true acidity. The differences in the Sørensen values yielded by the 2 acids are probably due to differences in their strength, the colloidal clay acid being a much weaker acid than AcOH. The fact that one is colloidal and the other crystalloidal is due merely to differences in the complexity of their mols. and not to any fundamental difference in the nature of their acidity.

J. M. B. (C. A.)

Heat of formation of sodium silicate. CAMILLE MATIGNON. *Bull. soc. chim.*, **35**, 29-31(1924).— Na_2SiO_3 in soln. was decomposed by HCl, the heat of combination of Na_2O and hydrated SiO_2 was thus found to be 51.10 cal. If this result is compared with TCHERNOBAEFF's, 45.2, obtained with anhydrous SiO_2 , it would seem that heat is absorbed in the hydration of SiO_2 . M. thinks there is a mistake somewhere. MULERT's result, 69.7, he rejects as too high, because it is about equal to the heat of formation of Na_2CO_3 , while the analogy of the compds. of Ca and Fe indicates that the heat of formation of the metasilicates should be lower than of the carbonates.

W. P. W. (C. A.)

A new application of the bar method for the measurement of thermal conductivity. MARCUS O'DAY. *Phys. Rev.*, **23**, 245-54(1924).—The bar method is defined as that, originally suggested by KOHLRAUSCH and employed by JAEGER and DIESSELHORST, where the condy. measured is that of a bar of metal, electrically heated, and running between blocks at const. temp. The mathematical treatment includes 2 methods, one due to CALENDAR, one apparently original, by which some of the disturbing effects are balanced against each other and so made to vanish. The precision, that is, the completeness, with which this was done was not estimated, nor was the accuracy of the final results. For Pb the condy. was found: at 0° , 0.0877; at 26.5° , 0.0920; at 53.1° , 0.0955. For Sn at about 25° , 0.1575. The method can be modified to measure the Thomson effect, and is about 10 times as sensitive as most other methods. An effect of 0.4° in about 150° , or 3 per mille was obtained, giving $S = 9.7 \times 10^{-7}$ cal. per coulomb per sec. at 38° for Sn.

W. P. W. (C. A.)

Comment on the principle of a general method for determining the heat capacity of solids and liquids and on its application to the determination of the water equivalent of calorimetric bombs. CHARLES MOUREU, CHARLES DUFRAISSE AND PHILIPPE LANDRIEU. *Compt. rend.*, **177**, 996-7(1923).—The authors have learned that their supposed new methods of using twin calorimeters (C. A., **18**, 933) was described by

PFAUDLER, and propose to call it by his name. [It was really originated by JOULE (1845), however.—ABSTR.] W. P. W. (C. A.)

The relation between Young's modulus and atomic volume. ALBERT PORTEVIN. *Compt. rend.*, **177**, 634-6(1923).—PECZALSKI's formula connecting YOUNG'S modulus E with density and at. mass $E = 8 \times 10^5 (\delta/M)^2$ in kg./sq. mm. has been applied to definite chem. compds. The calcd. values when compared with those obtained by direct measurement or deduced from the compressibility values show about the same degree of error. By means of the formula one can obtain an indication of the order of magnitude of the modulus. L. T. F. (C. A.)

Oxidation of chromite and preparation of chromates. BOGITCH. *Compt. rend.*, **178**, 2254-6(1924).—B. gives results of expts. upon conditions of roasting which give most complete oxidation. Chromite from New Caledonia, contg. 52% Cr_2O_3 and 12% FeO and Fe_2O_3 , ground to 200 mesh, was heated in small boats in a tube furnace. The proportion of fluxes required varies with the ore and also with conditions of roasting. For the sample used more than 60 parts of CaO and more than 25 parts of Na_2CO_3 per 100 parts of ore were required to obtain 90% oxidation. By using 100 parts CaO and 70 parts Na_2CO_3 per 100 parts ore and heating 1 hr., 900° was found to be the optimum temp. producing 97% oxidation. At this temp. with layers 2-3 mm. thick oxidation was 80% complete in 15 min., 92% in 30 min., 97% in 60 min. and 97.5% in 120 min. By heating 1 hr. at 900° and using for 100 parts of mineral 70 parts of alkali salt and 100 parts of CaO or CaCO_3 , the following per cents of the Cr_2O_3 were oxidized: $\text{Na}_2\text{CO}_3 + \text{CaCO}_3$, 99%; $\text{Na}_2\text{CO}_3 + \text{CaO}$, 97%; $\text{CaO} + \text{NaCl}$, 58%; $\text{CaO} + \text{Na}_2\text{SO}_4$, 70%. A. R. M. (C. A.)

Viscometry and plastometry. A. DEWAELE. *J. Oil Colour Chem. Assoc.*, **6**, 33-88(1923).—A discussion of viscous flow, kinetic energy correction, slippage, turbulence, end effects, etc., as applied to viscosity measurements with capillaries. The plastometer used embodies the usual principles of efflux viscometers excepting that higher pressures of shear than can conveniently be obtained by a head of liquid are obtained by air pressure. The app. is described in detail, and results are plotted and tabulated. These indicate that the work of BINGHAM, GREEN and others (C. A., **14**, 1047; **16**, 2447) has been based on an insecure foundation in that curvature of the relationship between pressure and vol. of flow per unit time has been interpreted as slippage; this resulted from their failure to explore the P/Q relationship at sufficiently high rates of shear and from confining their attention to substances of low plasticity. A direct mathematical disproof is derived of the validity of the relationship expressing BINGHAM's law of plastic flow. The analogy between plastic bodies and liquids is shown by simple relationships of the equations of shear. Discussion and correspondence follows. BINGHAM and GREEN wholly disagree with deW.'s conclusions and formula. F. A. W. (C. A.)

Heat balance for gas producers. W. B. CHAPMAN. *Chem. Met. Eng.*, **29**, 270-1 (1923); *Iron Coal Trades Rev.*, **107**, 294; cf. C. A., **17**, 3088.—The av. of 12 typical tests on the HUGHES, MORGAN, WOOD and CHAPMAN producers is taken as the basis. The heating value of the gas was 154 B.t.u. The input shows 97.5% in the coal and 2.5% in the steam. The efficiency of the producer, cold gas 74.61%, hot gas 86.03%; total losses 13.97%—radiation 11.69%, sensible heat of cooling water 0.97%, unburned C in soot 0.97%, in ash 0.34%. Specific directions are given for calcg. the different items in the heat balance. J. L. W. (C. A.)

The indentation hardness of metals. K. HONDA AND K. TAKAHASHI. *J. Iron and Steel Inst.* (advance proof), **1924**, 11 pp.—In the usual method of measuring the Brinell hardness, the impression is measured after the load is removed; but in hard metals, and especially in quenched steels, the recovery of the impression after unloading

is considerable, so that the hardness thus obtained is very ambiguous. The Brinell hardness, when the impression is measured during the application of the load, is quite correct, and much less than that by the usual method of measurement. As the definition of hardness, the present authors adopt that proposed by WÜST and BARDENHEUER; that is, the hardness is measured by the work required to produce the unit vol. of impression. The hardness depends upon two const., k and a , characteristic of the substance; k depends on the elastic deformation, and a is the const. depending on the permanent deformation beyond the elastic limit. In the new definition of hardness, the initial hardness is given by $H_0 = k/\pi D$, D being the diam. of the ball. The hardness for a given load is $H = k(3 + 2ah)/\pi(3D - 2h)$. This obviously increases with the load.
E. A. M. (C. A.)

The determination of minerals by the microscopic examination of their streaks. P. GAUBERT. *Compt. rend.*, **177**, 960-2(1923).—The general procedure is discussed. The streak upon a depolished plate of glass or quartz permits a more rapid detn. than the examn. of powder and has a further advantage of using but traces of the mineral. This method is delicate, e. g., 0.00001 mg. of galena with HNO_3 will show crystals of $\text{Pb}(\text{NO}_3)_2$.
L. W. R. (C. A.)

Sintering: its nature and cause. R. C. SMITH. *J. Chem. Soc.*, **123**, 2088-94 (1923).—It has been shown that: (1) sintering may take place in cryst. and amorphous substances; (2) the sintering of a cryst. substance is due to a change in size of the crystals or to the formation of an allotrope; (3) the sintering of an amorphous substance is due to the formation and growth of crystals.
H. J. C. (C. A.)

Reduction of copper oxide by carbon monoxide and the catalytic oxidation of carbon monoxide in the presence of copper and copper oxide. H. A. JONES AND H. S. TAYLOR. *J. Phys. Chem.*, **27**, 623-51(1923).—The reaction $\text{CuO} + \text{CO} = \text{Cu} + \text{CO}_2$ occurs at a Cu-CuO interface, the production of CO_2 being negligible until Cu nuclei are established in the mass of CuO. As the boundary between the solids extends outward from the nuclei, the rate of CO_2 production increases at first and then diminishes as the reduction of CuO is completed. The original formation of Cu nuclei is retarded by the presence of CO_2 . A suggested explanation is an adsorbed protection film of CO_2 on the CuO surface. This process is also retarded at low temp. by O in small concn., which oxidizes any Cu produced and thereby retards the spread of the Cu-CuO interface. At high temps. the formation of the nuclei exceeds the oxidation rate so that the reduction increases with time. The reaction $2\text{CO} + \text{O}_2 = 2\text{CO}_2$ in the presence of CuO is relatively slow with alternate reduction and oxidation at the interface. In the presence of reduced Cu the reaction is practically instantaneous and consists of the oxidation of an adsorbed layer of CO. These results are strikingly parallel to those of TAYLOR and BURNS (C. A., **15**, 3922) on the combination of H and O over Ni. The "poisoning" by O in the CO- O_2 combination over Cu is classed as permanent because reduction of CuO is necessary rather than the sweeping out of an adsorbed substance.
J. M. B. (C. A.)

Action of silica on electrolytes. A. F. JOSEPH AND J. S. HANCOCK. *J. Chem. Soc.* **123**, 2022-5(1923).—The effect of SiO_2 on a soln. of an electrolyte appears to be due to a chem. change resulting in the formation of free acid and of a complex silicate of low soly. but alk. reaction. Pure SiO_2 produces no effect on a soln. of an acid. The reduction of acidity ordinarily observed does not occur when the SiO_2 is well purified.
H. J. C. (C. A.)

Constitution and evolution of precipitates of alumina. P. PASCAL. *Compt. rend.* **178**, 481-3(1924); cf. C. A., **17**, 672, 697.—The magnetic susceptibilities of the following preps. were measured: 1a, gel formed by addn. of excess of NH_4OH to a satd. soln. of alum; 1b, the same left 50 hrs. in contact with the liquid; 2, gel obtained by drop-

wise addn. of the theoretical amt. of NH_4OH to satd. alum soln.; 3, gel prepd. like the preceding but with merely moistened alum which was continuously ground in a mortar during the addn. of NH_4OH ; 4, cryst. Al_2O_3 from solns. of K aluminate; 5, anhydr. Al_2O_3 derived from the preceding preps. *Conclusions.* At formation the gels consist solely of anhyd. Al_2O_3 with adsorbed water; on long standing this Al_2O_3 hydrates to the unstable $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ of VAN BEMMELEN, which is quite distinct from the cryst. hydrate (4) of the same compn.; neither form is to be regarded as $\text{Al}(\text{OH})_3$ and this distinction makes comprehensible the insoly. of these gels in the alk. liquids in which they are pptd. In solns. of aluminate practically all the Al is present as colloidal Al_2O_3 ; in them $\text{Al}(\text{OH})_3$ is not detectable by magnetic analysis. This substance, like orthostannic and orthosilicic acids, has not been isolated.

A. R. M. (C. A.)

Determination of carbon in fuels, organic matter, refractories, alloys, etc. E. GOUTAL. *Chaleur et industrie*, 5, 409-12(1924).—The method consists essentially in burning on O under pressure of about 20 atm. in a two-valve bomb, passing the combustion gases through standard NaOH, pptg. CO_2 with BaCl_2 , and titrating the excess of NaOH. The valves are on the body of the bomb and permanently connected to the O cylinder and the absorber, resp. The cover carries only the elec. connections for ignition. With difficultly combustible material, combustion is ensured by use of about 4 g. of Fe filings. The app. and technic are minutely described. The method is quick and accurate, and gives the same results as the usual combustion in a furnace with O atm. pressure. But with exceptionally difficultly combustible materials (*e. g.*, alloy steels), the bomb gives slightly higher results owing to more complete combustion.

A. P.-C. (C. A.)

PATENT

Process of making sodium aluminate and other products. CHARLES E. PARSONS. U. S. 1,522,698, Jan. 13, 1925. The process of making sodium aluminate, calcium silicate and magnesium silicate from blast fur. slag contg. combined aluminum, calcium and magnesium, which consists in finely dividing said slag; adding sodium hydroxide thereto, digesting the mixt. thus produced at a superatmospheric press. until the desired products are formed; sepg. out the sol. sodium aluminate from the insol. silicates thus produced; and sepg. out from the residue the desired calcium and magnesium silicates.

General

Utilization of waste gypsum. KIYONOBU KISHIMOTO. The Osaka Indus. Lab., *Bull.* 5 [2], 12(1924).—Plaster of Paris prepd. from waste molds or other artificial gypsum is usually useless, since plaster or molds made of it are weak and porous. However, the waste gypsum can be used in the manuf. of Keenes or Marble cement. The author has studied the manuf. of Keenes cement from waste molds and has succeeded in prepg. the cement, which is equal in quality with that made of natural gypsum, with the following process: The waste gypsum is dehydrated to sol. anhydrite at $150\text{--}170^\circ\text{C}$, dipped in 3-5% soln. of alum overnight so as to make the content of anhydrous alum in the finished product lie between 1.5-2.5%, and is then ignited at $700\text{--}800^\circ\text{C}$ for an hour. The ignition at a too low temp. makes the product grey and not friable, while that at too high temps. reduces its strength; its setting is accelerated with increase of alum. Other processes, *e. g.*, one, in which the waste molds were heated at 700°C instead of $150\text{--}170^\circ\text{C}$ as described above, gave poor results.

S. K.

Refractory industry of New Jersey. F. B. ALLEN. *The Ceramist*, 5, 21-8(1924).—Besides a brief history of the industry, the author describes the processes used in manuf. He attributes the disparity of the growth of the industry in N. J. as compared with that in Pa. and Ohio to the following causes, namely, the development of the iron and

steel industry in western Pa., higher cost of the soft mud process commonly used in mfg. N. J. fire brick; the lack of cheap fuel; and the higher cost of mining N. J. clays.

C. W. P.

Winning and preparation of English china clay. GEO. BRIAN. *The Ceramist*, **4**, 271-82(1924).—Brief historical statement together with detailed description of processes used.

C. W. P.

Liquid air as an explosive for blasting large masses. A. J. M. *Rev. Mat. Constr. Trav. Pub.*, **182**, 292-6(1924).—On a surface cutting 52 m. long, 6-9 m. wide and 12 m. high, 10 holes were drilled about $11\frac{1}{2}$ m. deep and $4\frac{1}{2}$ m. apart. Each hole was charged with 12 cartridges of liquid air, each 50 cms. long and 12 cms. in diameter. A total of 800 l. of liquid air were necessary. The ignition was effected with detonating cord, the 10 explosions occurring simultaneously. About 4000 cu. m. or 8000 tons of limestone were displaced. For the work the cost of the explosive is estimated at half that for ammonal, and at a third for dynamite. Another expt. wherein 4 holes were charged at the same time is also described. Plans of the borings with photographs of the setting before and after the explosions are included.

L. N.

Sand blast sand. W. M. WEIGEL. Repts. of Investigation, No. **2615**(1924).—Bur. Mines Serial.

P. D. H.

Show your business in pictures. G. W. GREENWOOD. *Brick and Clay Rec.*, **65** [12], 834-9(1924).—A new and simple idea in charts is given which enables the manager to tell at a glance the status of his plant. Charts showing sales, production, shipments, accounts receivable and other such data have been prep'd. from a representative table, and are included.

P. D. H.

Lubrication of clay working machinery. ANON. *The Clay-Worker*, **82** [5], 388 (1924).—The September, 1924, number of the house organ publication called "Lubrication," issued by the Texas Company, 17 Battery Place, N. Y. City, was devoted to the subject of lubrication of clay products machinery. The type of lubrication is given that is best suited, including everything from hoisting equipment to drier cars. Pottery machinery is also included.

P. D. H.

The production and marketing of clay. ANON. *The Clay-Worker*, **82** [5], 393 (1924).—The special report of the U. S. Geological Survey on the clay mined and marketed in the U. S. in 1923 is briefly reviewed. This report prepared by JEFFERSON MIDDLETON has been issued as a section of the report on the Mineral Resources of the U. S., 1923, part II, pages 71-78.

P. D. H.

The proper lubrication for gears. A. L. NUGEY. *The Clay-Worker*, **82** [5], 402 (1924).—The lubricant should be of a very viscous nature. A very viscous oil offers the greatest resist. to being squeezed out between the pressure surfaces of gear teeth. To produce such a fluid lubricant requires a mixt. of a pure mineral oil with castor oil which must be effectively combined in order to insure against subsequent separation.

P. D. H.

Clay output in U. S. (1923). ANON. *Jour. Soc. Chem. Ind.*, **43**, 1260(1924).—The clay mined in 1923 was 3,434,660 T. as compared with 2,647,700 T. in 1922. Imports of clay increased by 30,703 T., or 9% in quantity, and \$266,348, or 8% in value. Clay exports increased by 37,219 tons or 78% and the value increased \$195,295, or 45%, compared with 1922.

H. H. S.

Elementary science in relation to clayworking. VI. ANON. *Brit. Clayworker*, **33**, 225-6(1924).—The determination of lime in clays is described.

H. G. S.

The best type of drive. ANON. *Brit. Clayworker*, **33**, 229-30(1924).

H. G. S.

The service rendered by technical societies. A. T. HINCKLEY. *Trans. Am. Electrochem. Soc.*, **45** (preprint)(1924).—Presidential address.

C. G. F. (C. A.)

Research work in industry. J. G. PEARCE. *Iron Coal Trades Rev.*, **109**, 202

(1924).—British industry remains in the hands of independent manufg. concerns, limited in size and output. This condition makes for the development of research on a coöperative basis, as the Cast Iron Research Association. This organization maintains a technical information bureau and does research on special problems described.

J. F. B. (C. A.)

Selective instruction. ALEXANDER SILVERMAN. *Ind. Eng. Chem.*, **16**, 858-9 (1924).

E. J. C. (C. A.)

The calculation of heat regenerators. EDMOND NOAILLON. *Rev. universelle mines*, **17**, 413-48(1923).—Purely mathematical. Formulas are developed for detg. the temps. of gases leaving regenerators and the heat recovered, from which the best dimensions and construction of regenerators can be calcd. The derivation is very complex, since the final temp. and heat recovered depend on the heating surface and its temp. at all points, the latter in turn being a function of several variables. C. C. D. (C. A.)

Molding sands and mold tests. L. TREUHEIT. *Stahl u. Eisen*, **43**, 1494-8(1923).—The ordinary method of testing cores or molds is by pressure of the fingers. A gage here is recommended which will give more uniform readings and thereby tell more exactly the condition of the mold. When molds are stamped by hand, machine or air hammers, the uniformity is hard to gage. Since the casting is affected by the condition of the mold, the gage here described is used to test this condition.

W. A. M. (C. A.)

PATENT

Artificial meerscham. P. DEUSSING. U. S. 1,507,545, Sept. 2. A substance commonly used for the manuf. of earthenware composed of Hallic earth and Meissner clay is ground with whiting and quartz dust, H_2O is added and the mixt. is subjected to filtration to form a paste. The latter is allowed to dry after placement in well dried molds and is then subjected to biscuit baking as in the manuf. of porcelain. (C. A.)

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Abrasives

Corundum (South Africa). A. L. HALL. *S. A. Jour. of Ind.*, **7**, 801(1924).—Corundum occurrences in S. A., extent and situation of fields which are the most extensive on record; varieties of corundum; mode of occurrence, methods of mining and market preparation; quality of the corundum; and the manuf. of grain corundum are discussed. Statistical information, prospects of the corundum indus., a brief bibliography and a list of producers conclude this article. See also *Ceram. Abs.*, **3** [6], 188 (1924). O. P. R. O.

PATENT

Aluminous abrasive material and method of making the same. OTIS HUTCHINS. U. S. 1,524,134, Jan. 27, 1925. As a new article of manuf., fused aluminous mat. having more than 25% enclosed pores.

Art

PATENT

Fine ceramic products. WILHELM VERSHOFFEN. Ger. Pat. 371,593. (*Chem. Tech. Uebersicht*, 192, *Chem. Zeit.*, **48**, 130-2(1924).—To the clays employed before molding, water sol. fluoride compds. are added in order to start a chem. reaction in the mass. The molded article is easily hardened. W. S.

Cement, Lime and Plaster

Action of sugar on properties of Portland cement mortars. M. CONSTANTIN TSOUNTAS. *Rev. Mat. Constr. Trav. Pub.*, **182**, 281-3(1924).—The addn. of small

PORTLAND CEMENT. No. 1

| | Set in minutes | |
|-----------------------|----------------|-------|
| | Initial | Final |
| Pure water | 86 | 240 |
| Water with 0.1% sugar | 60 | 210 |
| Water with 0.2% sugar | 53 | 175 |
| Water with 0.3% sugar | 46 | 155 |
| Water with 0.4% sugar | 35 | 105 |

PORTLAND CEMENT. No. 2

| | Set in minutes | | Tensile strength { Kgs. per sq. cm. | | | |
|-----------------------|----------------|-------|-------------------------------------|------|------------|------|
| | | | Neat | | 1:3 Mortar | |
| | Initial | Final | 7d. | 28d. | 7d. | 28d. |
| Pure water | 45 | 130 | 40.3 | 44.7 | 21.0 | 26.4 |
| Water with 0.5% sugar | 3 | 7 | 38.5 | 41.6 | 16.5 | 19.8 |
| Water with 1.0% sugar | 5 | 8 | 33.2 | 35.1 | 12.6 | 14.3 |
| Water with 2.0% sugar | 7 | 27 | briquettes disintegrated | | | |
| Water with 3.0% sugar | 7 | 36 | | | | |
| Water with 4.0% sugar | 7 | 45 | | | | |

quantities of sugar to Port. cement mortars has the effect of decreasing the time of initial and final set, lowering the strength of the resultant mortar, and causes a general weakening of the structure. It is assumed that the hydrated lime set free during the decompn. of the tricalcium silicate on the addn. of water, combines with the sugar to form saccharates of lime. The attack on the cement mortar and the resultant weakening is then proportional to the sugar content. See *Ceram. Abs.*, 3 [5], 119(1924).

L. N.

The behavior of the alkalis in cement during the water storage of cement and cement mortar bodies. V. RODT. *Cement*, 13, 470-2(1924).—Of the total alkly. dissolved during the storage of briquettes in distd. H_2O 30% was due to Na_2O and K_2O and 70% to CaO and MgO . The alkali:alk.earth ratio remained unchanged during storage in the absence of air. By using tap water and 0.0-0.9 g. sugar per 10 l., no CaO was found in soln. after 2 days while the amts. of $NaOH$ and Na_2CO_3 increased with time of storage and concn. of the sugar soln. The effect of the sugar in delaying the set of the briquettes perhaps accounts for the increased alkali liberated.

H. F. K. (C. A.)

Mortar forming materials or mortar which is entirely impervious to humidity or passage of salts. J. H. DITTER. (Leipzig), *Chem. Tech. Uebersicht*, 192, *Chem. Zeit.*, 48 130-2(1924).

W. S.

PATENTS

Hydraulic limes and cements from residues of furnaces. DORA ENGELMANN AND GEORG BLOESY. Ger. Pat. 368,082, *Chem. Tech. Uebersicht*, 192, *Chem. Zeit.*, 48, 130-2 (1924).

W. S.

Enamel

Use sodium flux for iron. ANON. *Foundry*, 52, 982-4(1924).—The addn. of 7 lbs. of soda ash to 1500 lbs. of molten iron in the ladle, reduced the sulphur .06%. M. E. M.

Vitreous enameling with the electric furnace. E. F. COLLINS. *Fuels and Fur.*, 2, 1273-4(1924).—The use of the unmuffled radiant heat elec. fur. results in (1) freedom from contamination of product by combustion or other gases; (2) a negligible amt. of burned, blistered and improperly baked ware; (3) saving in floor space; (4) uniformity and a higher grade of ware; (5) good working conditions; (6) possibilities of using a conveyor type of baking fur.; (7) securing a vitreous coat that is adhesive and true to color; (8) a rapid heating of charge which can be controlled easily; (9) smooth, well covered edges free from defects. A table of cost data is given.

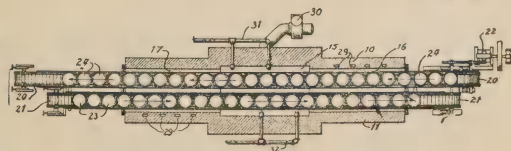
W. E. R.

Waste heat recovered for use in drying vitreous enamel. ANON. *Fuels and Fur.*, 2, 1283-4(1924).—A sheet metal recuperator in the fur. furnishes heat for the drying oven.

W. E. R.

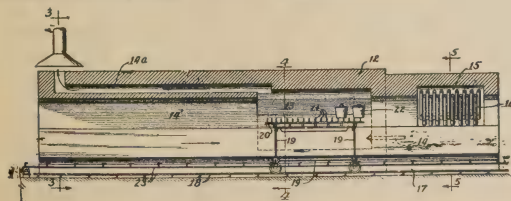
PATENTS

Annealing furnace. HERBERT CHARLES BEASLEY. U. S. 1,526,583, Feb. 17, 1925. The method of annealing articles which comprises utilizing the heat stored



in annealed articles to heat articles to be annealed while said articles are in an oxidation-preventing atm.

Enameling furnace. HERBERT CHARLES BEASLEY. U. S. 1,526,582, Feb. 17, 1925. In an enameling fur., a firing or fusing chamber embodying means for



raising the temp. therein to an enamel fusing point, a preheating chamber situated at one end thereof, a cooling chamber situated at the other end of said firing chamber, means for passing articles successively through the preheating chamber, fusing chamber, and cooling chamber, and means for controlling, to a predetd. degree, the cooling effect of said cooling chamber, said last means comprising a conduit through which a heat-absorptive medium may be passed.

Glass

Applied "theory" in the glass factory. BJARNE SCHJELDROF. *Fuels and Fur.*, **2**, 1137-8(1924).—Some of the factors which influence the formation of defects in glass are: Change in temp. in the different parts of the fur.; change in the fuel supply; change in the air supply; variations in batch compn.; variation in the charging; variation in the flow of glass from the melting to the refining end; variation in stack draft. It is the duty of the practical man to run the tank and of the theoretical man to supply him applicable quant. information on points where eye-sight and quick diagnosis will necessarily be fallible. W. E. R.

Pyrometers for glass industry. C. B. THWING. *Fuels and Fur.*, **2**, 947-8(1924).—Certain difficulties in the application of pyrometers in the glass indus. have been overcome. W. E. R.

The principles and practice of annealing glassware. S. R. SCHOLES. *Glass Indus.*, **6**, 8-9(1924). D. E. S.

Design and operation of hot gas producer plants. W. S. MAYERS. *Glass Indus.*, **6**, 1-7(1924). D. E. S.

Colored glasses in hollow glass works. CARL DUVIVIER. *Glass Indus.*, **5**, 229-31(1924).—Trans. from *Le Verre*, **4**, 197-9(1924).—This article gives the proportions of various oxides used in making colored glasses and some of the precautions necessary to success. D. E. S.

Finishing sixty thousand lamp chimneys a day. E. W. KOERING. *Glass Indus.*, **5**, 203-6(1924). D. E. S.

Cost of the glass product. G. WESLEY EVANS. *Glass Indus.*, **5**, 223-6(1924). D. E. S.

Some glassmakers' problems and how they were solved. IRVING E. ADAMS. *Glass Indus.*, **5**, 162-4(1924).—This article describes the solution of a number of problems such as elimination of seeds from glass, prevention of devitrification and scum, improving color, etc., and tells in each case the alterations to batch, firing conditions, etc., which were necessary to obtain best results. D. E. S.

Factors affecting the life of a tank. F. C. FLINT. *Glass Indus.*, **5**, 183-4(1924). D. E. S.

Dr. Shively on the use of alumina in glass. ANON. *Glass Indus.*, **5**, 165(1924).—For best results Al_2O_3 should not exceed 1.5%. It increases durability and strength, lowers annealing point, lengthens working range and aids in preventing devitrification of glass. D. E. S.

Some aspects of tank block corrosion. S. R. SCHOLES. *Glass Indus.*, **5**, 161-2(1924).—The theory is offered that grooves visible on tank side walls after long service are due to the sinking of heavy clay-bearing glass whereby fresh glass is continually presented to the clay surfaces which are attacked, and the cycle repeated. D. E. S.

Methods of analysis of the laboratory of the crystal glass works of Val-Saint-Lambert. AD. LECRENIER. *Glass Indus.*, **5**, 187-9(1924).—Translated from *Le Verre*, **4**, 125-8(1924).—This article gives methods and representative anal. of several of the mat. of glass manif. D. E. S.

On devitrification phenomena in practice in glass factory operation. HUGO KNOB-

LAUCH. *Glass Indus.*, 5, 206-10; 232-3(1924); 6, 10-11(1925).—Trans. from *Sprechsaal*, 57, May 23, 1924.

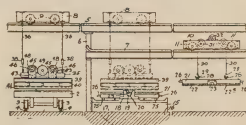
D. F. S.

Quartz glass. ANON. *Chem. Eng. and Min. Rev.* (Melbourne), 17, 114(1924).—Quartz glass for scien. purposes has been produced according to the Herberger method, by the German firm of Goertz for years. Finely divided quartz is melted in an elec. fur. in which a vacuum is maintained by continuous pumping until the whole is melted. The vacuum is then replaced by a gas such as carbon dioxide, under a press. of 8 to 12 atmospheres, and after considerable time the fused quartz is allowed to cool. The result is a block of quartz contg. only minute air bubbles in which the air press. is as nearly as possible that of the atmosphere, and therefore produces no elastic stress in the mat. It is considered that glass made in this way is as transparent in the ultraviolet as rock crys.

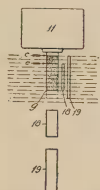
O. P. R. O

PATENTS

Turning plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,524,067, Jan. 27, 1925. The method of turning a plurality of pieces of flat glass without changing their relative arrangement, that comprises lifting the pieces of glass simultaneously by means of suction, placing the said pieces of glass simultaneously upon a support, placing another support upon said glass, inverting the said supports, removing the uppermost support, lifting said pieces of glass simultaneously from the

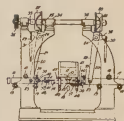


lower support by means of suction, and depositing said glass upon a grinding or polishing table.

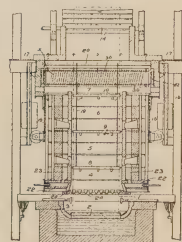


Method of obtaining varying charges of molten glass. WILLIAM A. LORENZ. U. S. 1,525,189, Feb. 3, 1925. The method of producing mold charges of different sizes for making glassware, which comprises severing a column of molten glass alternately at different locations in its path of discharge from a container.

Apparatus for obtaining charges of molten glass. WILLIAM A. LORENZ. U. S. 1,525,190, Feb. 3, 1925. App. for sepg. molten glass into mold charges of different sizes from glass discharged from the outlet of a container, comprising a plurality of severing means mounted to operate at different levels below the outlet, means for alternately actuating said severing means, and means for adjusting the levels to vary the propns. of the charges.



Apparatus for obtaining charges of molten glass. WILLIAM A. LORENZ. U. S. 1,525,191, Feb. 3, 1925. App. for sepg. mold charges of different sizes from a column of molten glass issuing from an outlet, comprising a plurality of coacting shearing devices mounted for movement below the outlet, independent means for supporting the respective severing devices, means for simultaneously reciprocating said severing devices on said supporting means, means for periodically changing the vertical positions of said supporting means in unison and at regular intervals prior to the time of severance to shift the paths of travel of said severing devices in a vertical direction, whereby said severing devices will sever the glass at different distances from said outlet.



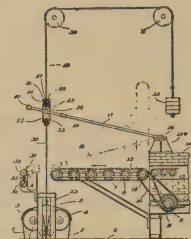
Leer for annealing sheet glass. HALBERT K. HITCHCOCK. U. S. 1,525,132, Feb. 3, 1925. In a leer for annealing continuously formed sheet glass, a casing, means for advancing the glass sheet through the casing, heating units located on opposite sides

of the sheet, and other separate heating units located along the opposite edges of the sheet so that the cooling of the edges of the sheet can be controlled independently of the cooling of the faces of the sheet.

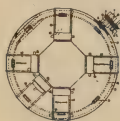


Sheet-glass clamp. GUSTAV EDWARD ERICSSON. U. S. 1,525,122, Feb. 3, 1925. In combination in a clamp for moving sheet material, a rigid inverted U-frame, block pivoted to the lower ends of the arms of the U-frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, positive operating means mounted above the jaws, and connections between said means and the jaws for moving the jaws upward relative to the frame.

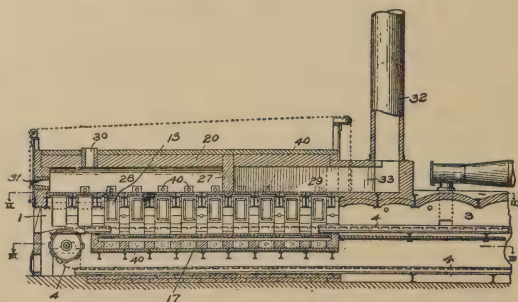
Apparatus for handling glass sheets. JOHN H. FOX. U. S. 1,525,124, Feb. 3, 1925. The combination with a vertical sheet glass drawing machine, of a counter-balanced clamping device above the machine adapted to engage the upper edge of the sheet and move upward therewith and give it support during and after the cutting-off operation, and a driven carrier extending laterally from a position adjacent the side of the sheet in position to receive the lower edge of the sheet when the clamp is in its upper position.



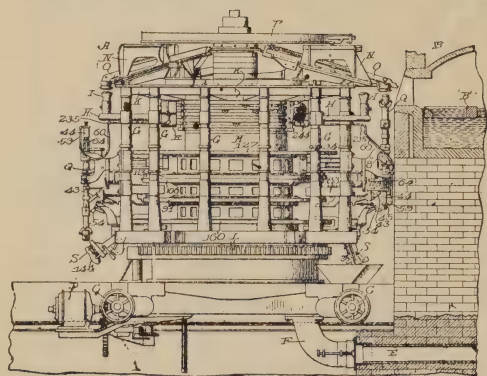
Method and apparatus for making plate glass. FLOYD V. KESSELMAN. U. S. 1,524,259, Jan. 27, 1925. The method of making flat glass that comprises delivering molten glass through a downwardly opening outlet in a succession of gobs or gathers, moving a series of casting tables in succession beneath said outlet through an annular path to receive said gobs thereon, and rolling said gobs into plates on said tables. App. for making flat glass comprising a rotatable support and a plurality of casting tables carried by said support and arranged to move continuously in succession beneath said feeder when said support is rotated, and a roll for each table arranged parallel and adjacent to the line of deposit of the glass on the table.



Annealing furnace. CHAUNCEY E. FRAZIER. U. S. 1,525,644, Feb. 10, 1925. In an annealing fur. the combination with a leer chamber of a fire-box overlying said leer chamber, a plurality of tunnel flues extending longitudinally beneath said leer chamber, a series of side-wall flues and transverse bottom flues connecting said fire-box with said tunnel flues, the side-wall flues toward the intake end of said leer connecting with one of said tunnel flues and the side-wall flues more remote from the intake end connecting with another of said tunnel flues, a chimney with which said tunnel flues communicate, and means for varying the draft conditions in the streams of flame and gas which flow from the fire-box to the chimney through the said severally connected sets of side-wall flues. In an annealing fur. the combination with a leer chamber, of an inlet chamber and a succeeding outlet chamber above the leer chamber, a plurality of longitudinal tunnel flues beneath the leer chamber, and a series of side-wall flues and transverse bottom flues connecting said inlet and outlet chambers with said tunnel flues, the side-wall flues near the opposite end of the furnace being



24, 1925. In a machine for producing glass articles, the combination with a blow pipe, of means for rotating the blow pipe, a marverer, and means for automatically causing the marverer to approach and recede from the gather during the marvering in a predetd. manner.

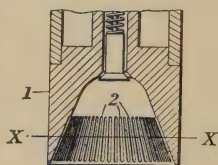


Glass-blowing mechanism.

AUGUST KADOW. U. S. 1,527,559, Feb. 24, 1925. Glass working mechanism comprising a spindle adapted to receive a plastic blank in its upper end while in vertical position, means for automatically supplying puffs of compressed air to the interior of said blank while in vertical position and for relieving the air pressure in the blank between successive puffs, whereby the plastic blank is permitted to sink back upon itself, and mechanism for causing said spindle to then swing out the blank.

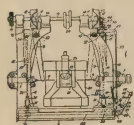
Process and apparatus for manufacture of blown articles.

WILLIAM J. WOODS. U. S. 1,527,947, Feb. 24, 1925. A pressing plunger for forming glass blanks from which elec. lamp bulbs are to be blown, having an internal cup-shaped cavity, the surface of which, at points forming the surface of the blank which are subsequently to form the surface of the neck of the bulb, is serrated.



Glass-feeding machine. EVERETT O. HILLER. U. S. 1,524,638,

Jan. 27, 1925. A glass feeding mach. comprising a plurality of elements coöperating to deliver mold charges of molten glass, having in combination means for independently rendering one of the elements inoperative, a cam rotating in timed relation to the operating element, and connections between the cam and the inoperative element to control its return to operative condition.



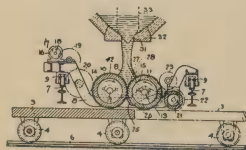
Apparatus for handling glassware. WILBUR S. MAYERS. U. S. 1,524,641, Jan. 27, 1925. In glassware handling app., a rotatably mounted table, a carrier for delivering ware to the table, a second carrier for receiving the ware from the table, one of said carriers being adjustable angularly with respect to the other, means for actuating said carriers and said table, and means for guiding the ware to and from the table to transfer it off of one carrier and on to the other.



Method and apparatus for making plate glass. FLOYD V. KESSELMAN. U. S. 1,524,179, Jan. 27, 1925. The method of making plate glass that comprises depositing

a stream of molten glass of substantially uniform cross-sectional area upon a pair of coöperating rolls while said rolls are stationary, imparting relative movement as between said rolls and glass in a direction transversely of the flow of glass, and rotating said rolls to extrude the glass between them in sheet form. App. for making plate glass that comprises glass-feeding means for producing a descending mass of

molten glass, a pair of coöperating rolls disposed beneath said glass-feeding means, means for producing relative movement between said glass and said rolls, thereby



distributing said glass lengthwise between said rolls, and means for rotating said rolls and for thereby extruding said glass between them in sheet form.

Borosilicate glass. SCHOTT and GEN. Brit. 219,972, Aug. 3, 1923. Optical borosilicate glasses contain K as the main alkali metal ingredient. The glass may contain B_2O_3 4-18, Al_2O_3 not more than 10, K_2O 3-19% and the remainder SiO_2 . Pb oxide or BaO may be present up to 35% and the Pb may be replaced by Sb and the BaO by CaO, MgO or ZnO. (C. A.)

Heavy Clay Products

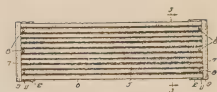
Thinning down brick wearing surfaces. WILLIS D. P. WARREN. *Eng. News-Record*, 94 [3], 116(1925).—Investigations tend to show that there is now a strong tendency to specify brick of $2\frac{1}{2}$ " to 3" in depth in preference to brick of $3\frac{1}{2}$ " to 4" in depth. Experience has shown that a 3-ton roller gives satisfactory results in the rolling of brick of $2\frac{1}{2}$ " and 3" in depth. These brick are widely used in the south and southwest and are being manufd. and sold in Ohio, Illinois and other north. states. It is recommended that a paving brick of $2\frac{1}{2}$ " depth be adopted for standard for all traffic except the very heaviest and that for the latter class of traffic a depth of 3" be adopted. A. H. K.

PATENTS

Removal of white excretions on brick and cement wares. Ger. Pat. 366,697. (Chem. Lab. fuer Tonindustrie.) H. SEEGER and E. CRAMER., *Chem. Tech. Uebersicht*, 192, *Chem. Zeit.*, 48, 130-2(1924). W. S.

Bricks, plates and other molded parts. AD. KURZELOWSKY. *Chem. Tech. Uebersicht*, 192, *Chem. Zeit.*, 48, 130-2(1924). Ger. Pat. 371,676. Mixt. of diatomaceous earth, peat, sawdust, lime, loam and hydraulic cements. The vegetable subs. are mixed with fluosilicate before adding to the other compds. W. S.

Metal pallet for brick or tile. IVAN N. DOUGHTY. U. S. 1,527,789, Feb. 24, 1925. A pallet of the class described, comprising a body member of corrugated metal, the corrugations extending longitudinally and providing reinforcement against longitudinal bending, the corrugations being formed upon smooth curves presenting rounded contact surfaces for mat. placed upon the pallet and permitting access to the air to the major portion of such surfaces, the lateral edges of the corrugated member being in a plane below the upper plane of the corrugations.



Refractories

Bauxite and aluminium. JAMES M. HILL. *Eng. Min. Jour.-Press*, 119 [3], 95 (1925).—It is estd. that the domestic production of bauxite in 1924 will be approx. 30% less than that of 1923. Supplies of bauxite were approx. 11% less than in 1923. Bauxite from South America is being used more extensively by makers of chemicals. Exports to Canada and Norway were greater during 1924. A. H. K.

Diatomite. A. W. ALLEN. *Eng. Min. Jour.-Press*, 119 [3], 96(1925).—The diatomite mining indus. showed expansion in 1924 due to a wider use of this mat. Research indicates a wider use of this mat. in the near future. A. H. K.

Refractories for boilers. L. LITINSKY. *Feuerungstechn.*, 13 [7], 70 (1925).—Refrac. classified according to position in fur. as follows: (1) mat. in close contact with the fuel bed, (2) mat. in contact with flame and hot gases, (3) mat. in contact with hot gases only. Refrac. can be divided into 3 main groups: (1) silica brick (acid), (2) clay brick (basic), (3) clay brick with free quartz added (semi-basic). A comparison of the chem. compn. of these is (1) SiO_2 95-96%, Al_2O_3 2-3%, (2) SiO_2 52-60%, Al_2O_3 36-42%, (3) SiO_2 65-

80%, Al_2O_3 15–30%. Conditions encountered by boiler refrac. are (a) high temp., (b) mech. strains, (c) rapid temp. changes, (d) changes in vol., (e) chem. action. Refrac. used in hottest parts should withstand S. K. 31–33 and those in other parts not less than S. K. 26. Tests of the resist. to load under high temp. are valuable in detg. suitability. Mech. strength detd. by compression tests. Varies from 60–200 kg. per cm^2 . Resist. to changes in temp. improved by use of coarse grog. Silica brick not suitable here but rather for conditions involving continuous even heat. Volume changes of the refrac. under operating conditions must be kept within limits. German Naval Specif. at one time called for a max. variation + or –2%. Silica brick tend to increase in vol. whereas clays high in Al_2O_3 tend to further shrinkage. To counteract these changes: (1) fire finished product sufficiently high, (2) calcine non-plastic ingredients at high enough temp., (3) counteract high shrinkage of basic mat. by addition of quartz which has a tendency to expand, or vice versa. In the design and construction of refrac. fur. linings the difference between temporary and permanent vol. change must be understood. Certain properties cannot be combined in one product such as d. and min. change in vol., high porosity and good condy., high porosity and high mech. strength, min. porosity and high resist. to temp. changes. Resist. to chem. action increases with lowered porosity. Mat. composed of similar ingredients such as clay and calcined clay grog more resistant than such contg. dissimilar ingredients, *i. e.* clay and quartz. Density and general physical properties more important than chem. compn. under these conditions. The action of salt fumes such as are produced in “salt glazing” was studied in its action on basic and acid refrac. linings. The latter were found more resist. probably because the protective coating of sodium silicate formed was more resistant to further action than sodium aluminum silicate. Quotes suggested specif. from Trans. Assoc. El. Power Stations, 1923, covering refrac. contg. not more than 75% SiO_2 . (a) *Refrac. qualities.* Grade 1, brick withstanding continuous temp. of 1750–1770°C equivalent to S. K. 34/35. Grade 2, those withstanding 1690–1730°C or S. K. 28/30. Grade 3, 1630–1670°C. Material at above temp. must show no change in shape or softening under oxidizing conditions. (b) *Composition and structure.* Covers chem. analysis, porosity, vol. changes on refiring, resist. to slag action. Resistance to temp. changes, mech. strength (min. 130 kg. cm^2), absorption (about 15% of dry wt. permissible). (c) *Dimensions and shape.* Sharp corners, plane surfaces, $\pm 2\%$ allowable variation with a max. of $\frac{5}{8}$ ". Warpage not over $1\frac{1}{2}\%$ of length. Brick must lay up with $\frac{1}{8}$ " joint. (d) *Vol. changes.* Under no circumstances must brick increase in vol. Sample fired at cone 14 for 2 hrs. must not shrink more than 1%. F. A. W.

Classification of refractories. V. BODIN. *Ceramique*, 27, 1–8(1925).—B. describes various methods of classifying refrac. His classification with respect to their resist. to load at high temps. is as follows:

| Temp at which the brick squatted under a load of 10 kgs. per cm^2 , °C. | | Temp. at which the brick squatted under a load of 10 kgs. per cm^2 , °C. | |
|--|------|---|------|
| Class | | Class | |
| 1 | 1630 | 11 | 1470 |
| 2 | 1620 | 12 | 1460 |
| 3 | 1600 | 13 | 1450 |
| 4 | 1590 | 14 | 1440 |
| 5 | 1560 | 15 | 1430 |
| 6 | 1520 | 16 | 1420 |
| 7 | 1510 | 17 | 1410 |
| 8 | 1500 | 18 | 1400 |
| 9 | 1490 | 19 | 1360 |
| 10 | 1480 | | |

Experience with siliceous material at Leopoldau Gas Works, Vienna. PRETSCH. *Gas World.*, **82**, 70(1925).—Original setting of clay gave trouble due to fusion because of high temp. at which setting was operated. In 1914 a change to silica was made on one unit and later entire works changed. Lowering of coking time 12% and 100°C cooler flues. Shut down part of set in summer with slight cracking of walls, but expansion gradually became constant. Three thousand days was the life of the silica when in use. S. S. C.

A heat insulator and filer aid. ANON. *Chem. Met. Eng.*, **31**, 973-4(1924).—A description of the deposits and plant of the Celite Products Co. M. E. M.

Common sense and common refractories. M. C. BOOZE. *Chem. Met. Eng.*, **31**, 1003-5(1924).—No marked increase in quality can be expected in fire clay or silica refractories. The only improvement to be looked for is a greater uniformity. M. E. M.

Testing refractory materials under load. ANON. *Gas J.*, **163**, 474(1923).—Detailed description of a new app. for detg. the softening point of refractory materials under load, and also automatically and graphically recording the thermal expansion before the softening point is reached, and the subsequent contraction or compression. J. L. W. (C. A.)

The addition of chromium oxide to silica bricks. STEN SANDLUND. *Jernkontorets annaler* (Sweden), **1923**, 45-52.—S. has tested a method suggested by Dornhecker for increasing the resistance of silica brick to the corrosive action of FeO-bearing slags by adding Cr_2O_3 to the brick. A protecting layer of the highly refractory Cr spinel, $\text{FeO} \cdot \text{Cr}_2\text{O}_3$, is supposed to be formed at the contact between the brick and the slag. In hand-made SiO_2 pots, fired at 1450°, slags of various compns. were melted at temps. of 1550-1600°. Charges of 10 g. were used. The melting period was 40 min. The compns. of the resulting melts are given. Cr was not found in any of the melts, which shows that Cr_2O_3 does not react to form a fusible compd. An increase from 2 to 5% of Cr_2O_3 in the SiO_2 pots has only a small influence on their resistance to corrosion. (C. A.)

PATENTS

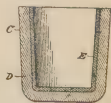
High refractories and other ceramic products. A. BIGOT. Ger. Pat. 379,098. *Chem. Tech. Uebersicht*, **192**, *Chem. Zeit.*, **48**, 130-2(1924). W. S.

High refractories. (A.-G. Hannover.) Ger. Pat., 371,675. *Chem. Tech. Uebersicht*, **192**, *Chem. Zeit.*, **48**, 130-2(1924).—Substance from zirconium oxide, silicon carbide and quartz. W. S.

Chamotte retort with internal protective layer and curved wall. STETTNER CHAMOTTE FABRIK A. G. Ger. Pat. 368,454. *Chem. Tech. Uebersicht*, **192**, *Chem. Zeit.*, **48**, 130-2(1924). W. S.

Basic refractory material and method of making the same. ARTHUR LEE BROWNE. U. S. 1,527,347, Feb. 24, 1925. A basic refrac. mat. for use in lining fur. consisting of the product formed by heating a mixt. of dolomitic limestone, 2.5% to 5% oxide of iron, and 1.5% to 2% feldspar, to a temp. above the mtg. point of feldspar.

Refractory product and method of producing same. HARRISON P. HOOD. U. S. 1,527,874, Feb. 24, 1925. In the manuf. of refrac. products from sillimanite, the method which comprises steps of reducing the sillimanite to a fine powder, then mixing with water to form a paste, and then shaping and firing to cause a sintering of the material.



Synthetic refractory material. JAMES F. MOLLEN AND WALTER W. PATNOE. U. S. 1,525,655, Feb. 10, 1925. A refrac. mat. suitable for fur. linings and the like, consisting of the calcination product of raw dolomite admixed with a small percentage of argillaceous matter together with a small percentage of common salt, such mat. being

in the form of heat-compacted masses of desired shape and size substantially clean and free from dust directly as made and having approximately the following percentage compn., *viz.*, lime and magnesia together 85 and argillaceous matter 14, the salt being substantially eliminated incidentally to calcination of the raw ingredients.

Fused ore of chromium oxide and method of making the same. MINER L. HARTMANN. U. S. 1,524,030, Jan. 27, 1925. The process of producing a refrac. article, comprising fusing chromium oxide ore and shaping the article from the fused ore.

Refractory material. JAMES E. SHEAFFER. U. S. 1,525,328, Feb. 3, 1925. A refrac. made from powdered calcined magnesite and lignin liquor.

White Ware

The production of porcelain for electrical insulation. FRANK H. RIDDLE. *J. A. I. E. E.*, 42 [4], 343-6(1923).—Pt. 1. This paper deals with the history of porcelain and its definition. Low fire porcelain is an agglomerate of clay and quartz held together in a matrix of molten feldspar. At the temp. to which transmission porcelain is fired (1350°C), the quartz is markedly dissolved and the clay substance dissociates with the formation of sillimanite. *Ibid.*, 42 [5], 540-3(1923).—Pt. 2. This paper deals with ceramic raw mats., chiefly clays, quartz and feldspar, and describes the occurrence and properties of the same. Other mats. may be substituted for quartz or feldspar. *Ibid.*, 42 [6], 631-5(1923).—Pt. 3. Testing and specif. of raw mats. are discussed in this paper. The chief properties necessary for a satisfactory elec. porcelain are, *d.*, dielec. resist., and mechanical strength. No one raw mat. possesses all. Proper blending is necessary. Glazes must be adjusted to the various types of porcelain. *Ibid.*, 42 [7], 743-7(1923).—Pt. 4. This paper deals with mfg. methods. Uniformity, grain size, and water content are of great importance in prep. the body. *Ibid.*, 42 [8], 858-63(1923).—Pt. 5. Forming the plastic clay body into the finished insulator shape prior to firing to vitrification is of great importance. Drying and glazing are also discussed. *Ibid.*, 42 [9], 988-94(1923).—Pt. 6. This paper deals with the firing of elec. porcelain. Elec. porcelains have an extremely narrow firing range. Periodic and continuous kilns are described. The Dressler continuous is economical and efficient for this type of work. *Ibid.*, 42 [10], 1097-1102(1923).—Pt. 7. This paper describes tests for detg. the porosity, mech. strength and elec. properties of insulation porcelains. The value and use of the microscope as an aid in the study of the quality and structure of porcelain is discussed. The effect of quartz inversions and other temp. reactions can also be detd. with the microscope.

H. G. F.

New decorating kiln produces exceptional results. ELMER C. COOK. *Fuels and Fur.*, 3, 17-20(1925).—A car tunnel kiln, 171 ft. long, with full complement of automatic control equipment has a capacity of 4000 doz. of china ware per 24 hrs., with a fuel consumption of 250 gal. of oil. High quality product is attributed to the fact that the soaking period charac. of the periodic kiln is eliminated. The kiln may be shut down over holidays without great loss, as it can be brought back to operating heat within about 4 hrs.

W. E. R.

Equipment and Apparatus

Thermoelectric pyrometers for the pottery. WILLIAM PRINTZ. *Fuels and Fur.*, 2, 1279-80(1924).—Pyrometers permit close watch of the firing and indicate and record ht. progression, resulting in fuel economy and increased production by shortening firing time. To give complete information the installation should consist of 3 or 4 couples located in different parts of each kiln.

W. E. R.

The origin of the Hardinge mill. J. C. FARRANT. *Chem. Age.*, 12, 98(1925).—

The cause for the producing of the present mill was from trouble in trying to produce fine mat. at a rapid rate in a copper plant in Colorado in 1906. The idea was obtained by the segregating of fines and coarse sizes on a dump conical in shape. The first installation produced 96 T. per 24 hrs. using 12.3 h. p. The screen analyses and power data obtained on other installations are given.

S. S. C.

Regrading the relation between rate of flow of Klever's rapid viscosimeter and Engler's viscosimeter. HELMUT W. KLEVER, ROBT. BILFINGER AND KARL MAUCH. *Z. f. angew. Chemie*, **37**, 693-5(1924).

W. S.

Crushing and grinding. I. S. G. URE. *Chemistry & Industry*, **43**, 1144-52(1924).—A mathematical analysis of the power required for crushing is given. A very complete description is given of jaw, disk and gyratory crushers.

L. A. P. (C. A.)

Automatic apparatus for metering and sampling fluids. KOCH. *Z. Zuckerind. cechoslov. Rep.*, **48**, 335-7(1924).—The app. rotates about the shaft A. C is a stationary delivery tube bringing in the liquid to be measured. An inner drum is divided into 3 compartments 1, 2, 3, connected to each other by the openings e_1 , e_2 , e_3 , and to the chambers I, II, III, by the openings b_1 , b_2 , b_3 . Liquid flows from C into 1 and thence through b_1 into I. When I is completely filled, liquid backs up in 1, and flows through e_2 and b_2 into II. As liquid collects in II the center of gravity of the app. changes and it rotates as shown by the arrow, discharging at f_1 . A counter on the shaft gives readings accurate to 0.02%. The sampling device consists of 3 small chambers fastened to one end of the drum, filling from the chambers I, II and III, and discharging to a launder as the app. rotates.

W. L. B. (C. A.)

Apparatus for the determination of melting and freezing points of pure substances and of eutectic mixtures. E. W. WASHBURN. *Ind. Eng. Chem.*, **16**, 275(1924).—The app. consists essentially in a Dewar flask of Pyrex glass, the inner tube of which is constricted at the bottom to form a receptacle for the substance being studied and the bulb of the thermometer. It is designed for the method of plotting the time-temp. curve while passing through the m. p. in either direction.

F. L. B. (C. A.)

A new micro-melting point apparatus. J. F. CLEVINGER. *Ind. Eng. Chem.*, **16**, 854-5(1924).—Details of construction and drawings are given of an elec. heated app. designed for attachment to a microscope stage, by which can be detd. accurately the m. p. of a single minute crystal. Details of operation, and also several results, are given. M. p. up to 400° can be detd.

E. R. G. A. (C. A.)

Filter plate of great strength. ANON. *Chem. Met. Eng.*, **31**, 509(1924).—A description of the properties (strength, soly. in various aqueous solns., etc.) of aluminous filter plates mfd. by the Norton Co.

E. G. R. A. (C. A.)

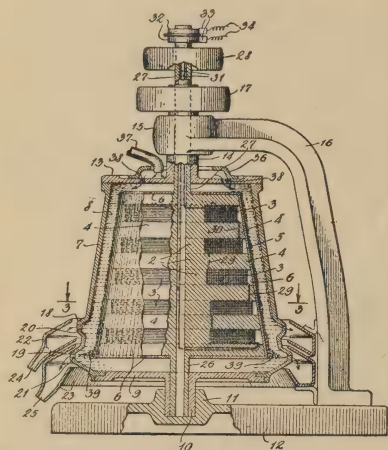
PATENTS

Humidity control of drying kilns. A. E. KRICK. U. S. 1,513,727, Oct. 28, 1924. In a kiln for drying lumber or other materials, automatic devices are arranged to produce alternate lowerings and raisings of the relative humidity of the air in the kiln.

(C. A.)

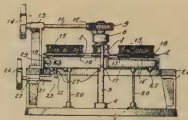
Rapid viscosimeter. H. W. KLEVER. Ger. Pat. 351,027. (Communication of Chem. Tech. Institute of Tech. Univ., Karlsruhe.) *Z. f. angew. Chem.*, **37**, 696, 861 (1924). The app. consists in its main parts of a htg. bath, an oil reservoir and a measure pipette. The oil reservoir is immersed into the bath and held in place by a brass cover mounted on a stand. The pipette is of glass with capillary tube of brass cemented on. Each instrument is calibrated individually and furnished with a curve by which the Engler values (detd. by Engler viscosimeter) can be obtained in a short time. A table shows viscosities of 7 different oils in °E (deg. Engler) at various temps. detd. with the rapid viscosimeter. The instrument also can be employed for measg. viscosities of porcelain slips.

W. S.



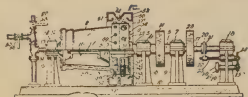
Magnetic centrifugal separator. ORRIN B. PECK, JR. U. S. 1,527,070, Feb. 17, 1925. In a magnetic centrifugal separator the combination of a rotatable electromagnet, a surrounding rotatable vessel with a sepg. channel between the vessel and the magnet, encircling the latter, adapted to hold liquid, and means for rotating the vessel and magnet separately, substantially as described.

Magnetic separator. ORRIN B. PECK, JR. U. S. 1,527,071, Feb. 17, 1925. In a magnetic separator the combination of a supporting member adapted to be rotated in a horizontal plane, an electromagnet thereon adapted to be carried by said member, a vibratable liquid and material container located

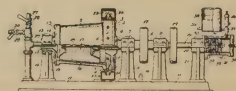


below said magnets with its top side below and adjacent to the path of travel of the magnet, means for revolving the supporting member and means for vibrating the container, substantially as described.

Centrifugal concentrator. ORRIN B. PECK, JR. U. S. 1,527,072, Feb. 17, 1925. In a centrifugal concentrator, the combination of a rotatable concentrating vessel, a rotatable core within the vessel, an attached head to said vessel provided with normally open concentrate discharge means adapted to be actuated to closure by relatively highly developed centrifugal force, and means for rotating the vessel and head, substantially as described.

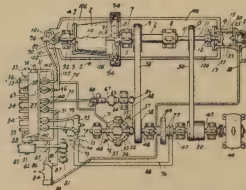


Centrifugal concentrator. ORRIN B. PECK, JR. U. S. 1,527,073, Feb. 17, 1925. In a centrifugal concentrator adapted to operate in successive cycles, each embodying a period of separation and accumulation of a bed of concentrates, and a period of discharging said concentrates, the combination of a rotatable tapering concentrating vessel, a relatively differentially rotatable core within said vessel adapted to be forced endways during operation in part by liquid pressure within the feed end of the vessel, means for supporting and rotating said core, and yieldable means in axial extension with said core for resisting longitudinal movement of the core in direction from the feed end of the vessel, substantially as described.



Process or method of and apparatus for magnetic centrifugal separation. ORRIN B. PECK, JR. U. S. 1,527,069, Feb. 17, 1925. The process of separating mixed magnetic and non-magnetic solids while pulverized and mixed with liquid, which consists in simultaneously subjecting such mixture to the opposing action of centrifugal and magnetic forces in a liquid filled channel under confined pressure, and to washing force of such liquid, substantially as described.

Plant for centrifugal concentration of ores and like materials. ORRIN B. PECK, JR. U. S. 1,527,074, Feb. 17, 1925. In a concentrating plant for treatment of finely divided mat. having constituents of different degrees of sp. gr., while mixed with liquid, the combination of a concg. element embodying a rotatable concentrating vessel adapted



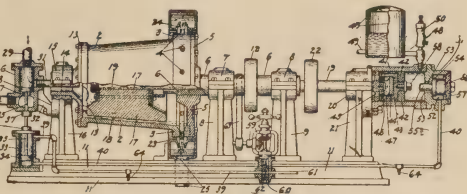
to operate in cycles, each embracing a period of collecting a quantity of heavier constituents at high speed and then discharging the same at relatively low speed of the vessel, and a core member adapted to operate at practically constant speed throughout said cycle, means for effecting such constant speed of the core, means for effecting such relatively high speed of the vessel, means for effecting and maintaining such low speed of the vessel without stoppage during the discharge period, and means for automatically functioning said several operations of the vessel, and core, governed in part by accretion of heavier constituents in the vessel, substantially as described.

Centrifugal concentrator.

ORRIN B. PECK, JR. U. S. 1,527,075,

Feb. 17, 1925. In a centrifugal concentrator the combination of a rotatable vessel, a differentially rotatable longitudinally movable core within the vessel, adapted in operation to be pressed towards the

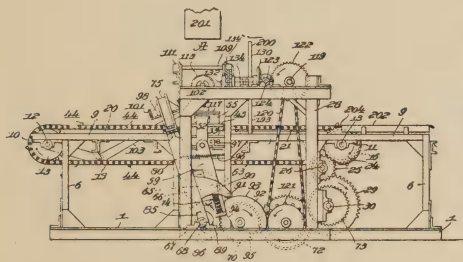
discharge end of the vessel, yieldable hydraulic means for resisting such endways pressure, means for feeding material and feeding water to said vessel at desired time, and means for hydraulically operating said feed means, substantially as described.



Apparatus useful in making plastic shapes.

CHARLES L. NORTON. U. S. 1,526,364,

Feb. 17, 1925. A machine of the class described comprising a conveyor for moving independent unconnected pallets, a movable mold box, means for pressing the mold box into engagement with successive pallets, and means whereby plastic material may forcibly be projected into the mold box while engaging a pallet plate, and means for positively ejecting the molded shape from the mold box.



Kilns, Furnaces, Fuels, and Combustion

Producer gas for glass tanks. BJARNE SCHIELDROP. *Fuels and Fur.*, 2, 945-7 (1924).—The coal used and the operation of gas producers should be uniform at all times, insuring a regular supply of gas of constant compn. and press. W. E. R.

Relation of fuel oil system to grade of oil used. LINCOLN T. BRADLEY. *Fuels and Fur.*, 2, 971-2(1924).—Fuel oil systems should be capable of burning heavy oil. Economy demands that specif. for fuel oil should not be more strict than the requirements of the plant. Maintenance of oil burners in good condition is of importance.

W. E. R.

Combustion devices for gaseous fuels. W. TRINKS. *Fuels and Fur.*, 2, 1035-8, 1157-60, 1249-52(1924); 3, 35-8(1925).—Burners are classified: A, gas and air are mixed in the fur.; B, gas and air are mixed outside the fur.; C, gas is mixed with some air outside of the combustion chamber, the rest of the air is mixed in the fur. The selection of the proper burner depends upon the kind of gas used, the fur. temp., the vol. of the fur. combustion chamber and the character of the flame desired. W. E. R.

Auxiliary equipment for oil burning. KESTER MILLER. *Fuels and Fur.*, 2, 1047-54, 1149-54, 1261-7(1924); 3, 139-46(1925).—Air compressing app. is grouped in 4 broad divisions: (1) Fans or centrifugal blowers, supplying air at pressures up to 24 oz. per sq. in.; (2) turbo-blowers or turbo-compressors, air from $\frac{3}{4}$ to 4 lbs. per sq. in.; (3)

positive press. rotary blowers, air normally from $\frac{3}{4}$ to 4 lbs., 10 lbs. per sq. in. max.; (4) piston compressors, for pressures from 20 lbs. per sq. in. upward. Characteristic curves for the different types are given. The ease of regulation of fans or centrifugal blowers is of special advantage in the application of temp. control equipment. Fans and turbo-blowers possess the advantage of compactness and steady flow of air. Positive press. blowers give a pulsating flow of air which must be equalized in a tank to provide the steady flow requisite to the opern. of oil burners; their efficiency is higher than that of other types of blowers for their particular press. range. Positive press. blowers of a special type, with liquid seal, deliver a steady flow of air and do not require air tanks. The piston compressor is used for supplying atomizing air at pressures of from 20 lbs. per sq. in. to 100 lbs. per sq. in. or over. The single stage compressor is most suitable for pressures from 15 to 60 lbs. per sq. in.; the 2-stage from 100 to 300 lbs. per sq. in.; and 3- and 4-stage types for pressures higher than any used in oil atomizing. For the range between 60 and 100 lbs. per sq. in. either single or 2-stage compression can be used, depending on capacity, cost of power, and altitude. The discharge from compressors is pulsating, so that a tank is required. The vol. of the tank in cu. ft. should be about $\frac{1}{5}$ of the piston displacement of the compressor in cu. ft. per min.

W. E. R.

Storage and handling of fuel oil. C. G. SHEFFIELD AND H. H. FLEMING. *Fuels and Fur.*, **2**, 1255-6(1924).—Part of a paper read before the A. S. M. E., Dec., 1924. Steel cylindrical tanks, usually vertical, are most satisfactory for fuel oil storage in indus. plants. Underground storage has the advantage of low fire hazard but a steel tank should never be placed underground where there is any danger of the water table being above the bottom of the tank. Storage capacity depends upon max. rate of consumption. Capacity for only slightly more than a tank car is inadvisable. Pipe lines from tank to burners should be as short as possible. A "swing suction" is best method for removal of oil from tanks. Heavy oils are heated by a steam coil in the bottom of a small tank or a steam coil around the suction pipe of a large tank.

W. E. R.

Hazards of industrial oil burning. H. E. NEWELL. *Fuels and Fur.*, **2**, 1257-8 (1924).—Part of a paper read before the A. S. M. E., Dec., 1924. Fuel oil storage tanks should be situated and erected in such a manner as to involve the least fire hazard.

W. E. R.

Excess air and the extra cost of fuel. W. F. SCHAPHORST. *Eng. Min. Jour.-Press*, **119** [4], 169-70(1925).—A simple chart is given by means of which the extra cost of fuel involved, by using excess air, is detd. To det. the min. wt. of air required for combustion it is necessary to know, approx. at least, the parts by wt. of carbon, hydrogen and oxygen in one lb. of fuel. To compute the number of pounds of air required per pound of fuel, divide the wt. of oxygen per lb. of fuel by 8 and subtract the result from the wt. of hydrogen in one pound of the fuel. Multiply the difference by 3. Add the product to the wt. of carbon in each lb. of fuel, then multiply by 11.6. The result is the number of lbs. of air required per lb. of fuel. To compute the expense involved by the use of excess air per year mathematically rather than by the use of the chart, subtract the temp. of the air passing into the fur. from the chimney-gas temp. and multiply by 1.05. Then multiply the result by the number of pounds of excess air used per hour. Then multiply that by the cost of fuel per ton. Then divide by the B. t. u. value per lb. of fuel.

A. H. K.

Blue water gas offers industrial fuel economies. D. J. DEMOREST. *Chem. Met. Eng.*, **31**, 887-90(1924).—Blue water gas is free from tar and soot, burns without smoke or soot, and has a high flame temp. Where a large number of small heating opens. are required in one neighborhood, and a central generator can be installed and gas piped

under press. to various points, blue water gas can compete with producer gas. With coke at \$10.00 per ton, this gas costs about \$0.27 per 1000 cu. ft. Its method of manuf. is outlined.

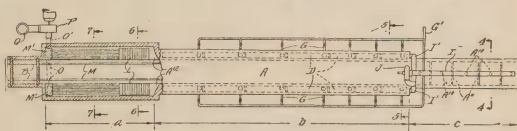
M. E. M.

Firing brick and tile, practical ways of reducing the cost. W. D. RICHARDSON. *Contract Rec. and Eng. Rev.*, 39, 77(1925).—At the 23rd Annual meeting of the Canadian Natl. Clay Products Assn. R. outlined 6 methods by which clay products may be mfd. more cheaply: (1) By better methods of firing and managing present kilns. (2) By using a more economical fuel in firing present kilns. (3) By more efficient and less wasteful furnaces on present kilns. (4) By employing forced or induced draft on present kilns. (5) By a regenerative system of present kilns. (6) By building a more efficient and economical type of kiln.

O. P. R. O.

PATENTS

Open-fire tunnel kiln. PHILIP D'HUC DRESSLER. U. S. 1,525,232, Feb. 3, 1925. The method of maintaining a graduated temperature along the length of an elongated heating zone of a tunnel kiln while minimizing temperature variations in any transverse plane through said zone, which consists in introducing heating gases into the kiln at the bottom of the pathway through the kiln for the goods along the length of said zone in such volume and at such temperatures and under such conditions of pressure and velocity that the heating gases thus introduced will flow mainly upward through said pathway from the points of gas introduction to the top of the pathway, and will impart the major portion of their available heat to the goods in their upward movement through the goods pathway.



Tunnel kiln. WINFIELD E. HINSDALE. U. S. 1,525,130, Feb. 3, 1925. A tunnel kiln having a continuous tunnel chamber and successive cars traveling therethrough, the kiln comprising a heating zone, a torrid zone, and a cooling zone, having end doors, and the inlet and outlet portions of the tunnel chamber formed of minimum cross-section closely approximating that of the carloads of stacked wares under treatment, whereby to substantially close the end portions of the tunnel and prevent inflow of air toward the torrid zone, and the firing chamber at the torrid zone of greater cross-section, and having a dead air insulation surrounding the tunnel chamber, whereby when once heated to operative incandescence the kiln conserves heat and permits economic operation, and means for absorbing heat radiated from the wares traversing the cooling zone, conveying such heat past the firing chamber, and radiating it in the heating zone to pre-heat the wares therein.



Geology

Bentonite, its occurrences, properties and uses. HUGH S. SPENCE. Rept. to Mines Branch, Ottawa, Can. Abstracted in *Can. Chem. & Met.*, 9 [2], 39(1925).—So far no attempt has been made to develop any of the Canadian bentonite deposits. Considering nearness to railway transportation the deposits showing the most promise for immediate cheap development are those at Rosedale, Alberta; Knolllys, Saskatchewan and Princeton, B. C. At Rosedale a seam 6 to 10 in. thick occurs in a coal mine. At Knolllys an 8 ft. bed of bentonite is exposed about 1/2 mile from a railway. At Princeton B. C., 2 thin bentonite beds are found in a coal mine and several promising outcrops have been noted nearby. American production is described. Nine classes of possible uses for bentonite are suggested.

F. G. J.

Cordierite, anthophyllite mineralization at Blue Hill, Maine. W. LINDGREN. *Proc. Nat. Acad. Sci.*, **11**, 1-4(1925).—A type of mineralization now found for the first time in America, but entirely similar to described occurrences from Fenno-Scandia. The ores are a replacement of the schist in which they form lenticular bodies. They are caused by emanations from the granite outcrops in the vicinity, the vapors contg. Fe, Mg, S and SiO_2 . Such magnesian metasomatism can probably only be carried out at very high temps. H. H. S.

Gel replacement, a new aspect of metasomatism. W. LINDGREN. *Proc. Nat. Acad. Sci.*, **11**, 5-11(1925).—Replacement of one mineral by another in the colloid state as gel happens in solid rocks more frequently than has been supposed. The gel may be converted later into a cryst. aggregate, becoming a metacolloid. Gel replacement operates at low temps. probably not above 300°C . Solns. or sols moving in capillary or subcapillary openings form the medium of attack and pptn. The author deals with replacement by silica gel, by sulphides, arsenides and sulpharsenides. H. H. S.

Bentonite and its uses. ANON. *Chem. Met. Eng.*, **32**, 59(1925).—Lists producers of this material in U. S. and Can., and gives an outline of possible uses. M. E. M.

Silica. HJALMAR E. SKOUGOR. *Eng. Min. Jour.-Press*, **119** [3], 97(1925).—Production of silica was stimulated during 1924. The silica industry should better itself by the operators availing themselves of various investigations enumerated which are concerned with the betterment of the industry. A. H. K.

Kaolin. R. T. VANDERBILT CO. *Eng. Min. Jour.-Press*, **119** [3], 97(1925).—Indications are that the domestic kaolin business during 1924 will far exceed that of 1923. Besides the marked improvement in vol., considerable activity in tech. developments connected with its use has occurred, especially in the pottery trade. Tests have proved to the potter that he can use large quantities of domestic kaolins to good advantage. The present indications point to the use of considerable quantities of kaolin in 1925 in the pottery trade where little or none has been used in the past. A. H. K.

Feldspar. FRANK P. KNIGHT. *Eng. Min. Jour.-Press*, **119** [3], 97-8(1925).—During 1924 the outstanding features in the feldspar indus. were a marked expansion in mill capacity, a finer grinding of the finished product, an increase in cost of the crude material and a decrease in the selling price of the finished product. In treating feldspar, the continuous grinding and air-sepn. process has become more firmly established. The indus. as a whole is facing a period of readjustment. A. H. K.

Australian clays in the manufacture of white pottery wares. R. C. CALLISTER. *Australia Inst. Sci. Ind. Bull.*, No. **27**, 87 pp.(1924).—Australia imports \$3,500,000 worth of pottery annually. Raw materials are available to produce most of this in Australia. A clay-washing plant is the greatest need. In expts. both electroösmosis and elutriation were tried with about equal results. Very careful purification is necessary and the firing must be approx. neutral. Neutralizing the creamy color with 0.0015% pptd. Co stain (0.2 g. $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$ to 0.1 g. Na_2CO_3) gave much whiter ware. Adding 0.1% dextrin or casein during the maturing period greatly improved the working properties. The Co stain was not effective when the $\text{Fe}_2\text{O}_3 + \text{TiO}_2$ exceeded 1%. Not over 10% ball clay must be used in semi-porcelains (adsorption about 6%) or the color will be too dark. C. H. K. (C. A.)

The world's biggest borax deposits. W. F. FOSHAG. *Eng. Mining Jour.-Press*, **118**, 419-21(1924).—The mineral colemanite supplies almost the total production of borax ores at present. Ulexite is an associated mineral, with other rarer borates found occasionally. Five principal localities have produced colemanite—Lockwood Valley, Lang, Borate, and Death Valley region, all in Calif., and Muddy Mountains, Clark Co., Nev. The ore occurs as irregular masses in soft shales associated with fine-grained sandstone, thin beds of cherty limestone, and volcanic flows. W. N. N. (C. A.)

Chemistry and Physics

A delicate method of detecting cobalt. S. J. JINDAL. *Chem. News*, 130, 34 (1925).— Na_2SiO_3 is added to soln. of Co salt producing blue ppt., addn. in excess gives blue soln. Acidity causes color to vanish. Br_2 water is added to silicate soln. giving black color. 0.000039 gr. of Co in 5 cc. can be detected. When Co is mixed with Ni, Ba, NH_3 , Ca salts the Co still showed the black. H_2O_2 , Cl_2 water may be used in place of Br_2 . H_2O_2 causes a greenish yellow color. Br_2 is recommended. The chemistry of the reaction is discussed.

S. S. C.

Table of atomic weights (O = 16.000) of the chemical elements issued by the International Union of Pure and Applied Chemistry, 1925. ANON. *J. Soc. Chem. Ind.*, 44, 138(1925).—

| | Symbol | Atomic number | Atomic weight | | Symbol | Atomic number | Atomic weight |
|------------|--------|---------------|---------------|--------------|--------|---------------|---------------|
| Aluminium | Al | 13 | 26.97 | Lead | Pb | 82 | 207.20 |
| Antimony | Sb | 51 | 121.77 | Lithium | Li | 3 | 6.940 |
| Argon | A(Ar) | 18 | 39.91 | Lutecium | Lu | 71 | 175.0 |
| Arsenic | As | 33 | 74.96 | Magnesium | Mg | 12 | 24.32 |
| Barium | Ba | 56 | 137.37 | Manganese | Mn | 25 | 54.93 |
| Beryllium | Be | 4 | 9.02 | Mercury | Hg | 80 | 200.61 |
| Gluciumium | Gl | | | Molybdenum | Mo | 42 | 96.0 |
| Bismuth | Bi | 83 | 209.00 | Neodymium | Nd | 60 | 144.27 |
| Boron | B | 5 | 10.82 | Neon | Ne | 10 | 20.2 |
| Bromine | Br | 35 | 79.916 | Nickel | Ni | 28 | 58.69 |
| Cadmium | Cd | 48 | 112.41 | Nitrogen | N | 7 | 14.008 |
| Caesium | Cs | 55 | 132.81 | Osmium | Os | 76 | 190.8 |
| Calcium | Ca | 20 | 40.07 | Oxygen | O | 8 | 16.000 |
| Carbon | C | 6 | 12.000 | Palladium | Pd | 46 | 106.7 |
| Cerium | Ce | 58 | 140.25 | Phosphorus | P | 15 | 31.027 |
| Chlorine | Cl | 17 | 35.457 | Platinum | Pt | 78 | 195.23 |
| Chromium | Cr | 24 | 52.01 | Potassium | K | 19 | 39.096 |
| Cobalt | Co | 27 | 58.94 | Praseodymium | Pr | 59 | 140.92 |
| Columbium | Cb | 41 | 93.1 | Radium | Ra | 88 | 225.95 |
| Niobium | Nb | | | Radon | Rn | 86 | 222. |
| Copper | Cu | 29 | 63.57 | Rhodium | Rh | 45 | 102.91 |
| Dysprosium | Dy | 66 | 162.52 | Rubidium | Rb | 37 | 85.44 |
| Erbium | Er | 68 | 167.7 | Ruthenium | Ru | 44 | 101.7 |
| Europium | Eu | 63 | 152.0 | Samarium | Sm | 62 | 150.43 |
| Fluorine | F | 9 | 19.00 | Scandium | Sc | 21 | 45.10 |
| Gadolinium | Gd | 64 | 157.26 | Selenium | Se | 34 | 79.2 |
| Gallium | Ga | 31 | 69.72 | Silicon | Si | 14 | 28.06 |
| Germanium | Ge | 32 | 72.60 | Silver | Ag | 47 | 107.880 |
| Gold | Au | 79 | 197.2 | Sodium | Na | 11 | 22.997 |
| Helium | He | 2 | 4.00 | Strontium | Sr | 38 | 87.63 |
| Holmium | Ho | 67 | 163.4 | Sulphur | S | 16 | 32.064 |
| Hydrogen | H | 1 | 1.008 | Tantalum | Ta | 73 | 181.5 |
| Indium | In | 49 | 114.8 | Tellurium | Te | 52 | 127.5 |
| Iodine | I(J) | 53 | 126.932 | Terbium | Tb | 65 | 159.2 |
| Iridium | Ir | 77 | 193.1 | Thallium | Tl | 81 | 204.39 |
| Iron | Fe | 26 | 55.84 | Thorium | Th | 90 | 232.15 |
| Krypton | Kr | 36 | 82.9 | Thulium | Tm | 69 | 169.4 |
| Lanthanum | La | 57 | 138.90 | Tin | Sn | 50 | 118.70 |

TABLE (Continued)

| | Symbol | Atomic number | Atomic weight | | Symbol | Atomic number | Atomic weight |
|----------|--------|---------------|---------------|-----------|--------|---------------|---------------|
| Titanium | Ti | 22 | 48.1 | Xenon | Xe | 54 | 130.2 |
| Tungsten | W | 74 | 184.0 | Ytterbium | Yb | 70 | 173.6 |
| Wolfgram | | | | Yttrium | Y | 39 | 88.9 |
| Uranium | U | 92 | 238.17 | Zinc | Zn | 30 | 65.38 |
| Vanadium | V | 23 | 50.96 | Zirconium | Zr | 40 | 91.0 |

The elements of atomic numbers 43, 61, 72, 75, 84, 85, 87, 89, and 91 have not been discovered.

H. H. S.

The behavior of sulphur and amorphous carbon at high temperatures. III. J. P. WIBAUT AND G. LA BASTIDE. *Rec. trav. chim.*, **43**, 731-56(1924).—In a previous paper W. (C. A., **16**, 2648) proved that when pure amorphous C is heated in an atm. of S vapor a "sulfurous carbon" is formed, contg. about 2% S, which can neither be extd. with solvents nor sepd. by heating in a vacuum at 1000°. From this it was concluded that this S was chemically combined with the C. The purpose of that work was to det. the conditions under which the "sulfurous carbons" that occur in gas coke or in metallurgical coke are formed. For that reason the C was exposed to S vapor at high temps. In continuing the expts. the influence of the temp. and duration of the heating on the reaction between S and C was studied. Since it was desired to work with finely divided amorphous C a series of expts. was made by heating mixts. of this with S in closed tubes at definite temps. Afterwards the contents were extd. with CS₂ and PhMe until no more S was removed. The residue was a carbonaceous substance resembling amorphous C with 10-25% S, depending on the temp. and duration of the heating. When amorphous C is heated with S at 600° for a long time in a closed tube, substances resembling the C used but contg. 18-25% S are formed. This S is combined with the C in some way, since by the action of solvents like PhMe, CS₂ and SCl the S content remains unaltered in some cases while in other expts. a small decrease was noticed. By heating these substances to 600° in a vacuum the greater part of the combined S is eliminated. The process thus seems reversible. It is possible that part of the S which seps. in a vacuum is combined in the surface layer of the C (adsorption) or is present in the C in solid soln. However, if this is the case it is hard to understand why this S cannot be extd. with solvents. While the greater part of the S in the "sulfurous carbons" with a high S content is rather closely combined a smaller portion is held in some other manner but more firmly, for during the heating in a vacuum small amts. of CS₂ are formed. Special expts. indicate that the CS₂ formed at 600° was not formed by the action of primarily sepd. S vapor in the C. The simplest interpretation of these facts is to assume that part of the S is combined with the C by valency forces. The CS₂ would be produced by the decompn. of such a C-S complex. Nothing definite can be said concerning the characteristics of these C-S compds. Finally a part of the S remains firmly combined with the C, since after heating at 1100° in a vacuum at 0.5 mm. "sulfurous carbons" remain contg. about 2.8% S. Nearly the whole of this combined S is eliminated as H₂S by the action of H₂ on these carbons at 500-700°. In the previous paper W. (*loc. cit.*) pointed out the analogy between the behavior of amorphous C toward S, and its behavior toward O as shown by the expts. of Rhead and Wheeler (C. A., **6**, 2567; **7**, 2362) and Lowry and Hulett (C. A., **14**, 2435). The facts described in this paper seem to corroborate this analogy. Finely divided artificial graphite fixes little or no S. Expts. with different specimens of amorphous C gave different results as to the quantity of S that is fixed. The samples of C used contained 0.2-0.5% H. If the action of S consisted in replacing this H, carbons with about 3% S could be produced. Besides the sulfurous carbons when heated *in vacuo* still give some H₂S so that not all

the H is displaced in carbons contg. 25% S. Mixer's (*Am. J. Sci.*, **45** [3], 373(1893)) conclusion that amorphous C fixes little S while "soft sugar charcoal," still contg. much H and O, can fix large amts. of S is not correct. W. and B. proved that amorphous C can fix large amts. of C. Expts. have not been made as yet with diamond dust. The work is being continued. E. J. W. (*C. A.*)

Composition of melilite. A. N. WINCHELL. *Am. J. Sci.*, **8**, 375-84(1924).—The dominant mols. in melilite are $\text{Ca}_2\text{Al}_2\text{SiO}_7$ (gehlenite) and $\text{Ca}_2\text{MgSi}_2\text{O}_7$ (åkermanite). The grossularite and andradite mols., which have been assumed in some melilites, are not similar to the chief components of that group and probably cannot enter the mineral. The assumed sarcolite "double mol.," $(9\text{Ca.Na}_2)_3\text{Al}_2\text{Si}_3\text{O}_{12}$, is not an entity, being actually composed of 60.65% gehlenite, 16.07 $\text{Na}_2\text{Si}_3\text{O}_7$, 14.87 $\text{Ca}_3\text{Si}_2\text{O}_7$ and 8.41 SiO_2 . Fe'' in melilite replaces part of the Mg of åkermanite; Fe''' the Al of gehlenite; excess Ca the Mg of åkermanite. Na and K in melilite may be assigned to $\text{Na}_2\text{Si}_3\text{O}_7$ and $\text{K}_2\text{Si}_3\text{O}_7$, resp., although other mols. are possible, one of which, NaAlSiO_7 , seems to be present in certain feriferous melilites. All mols. forming part of the space-lattice of melilite are of the same type, that is, they conform to R_3O_7 , in which R includes Si as well as metallic atoms. The theory that excess SiO_2 can exist in interat. spaces seems to correspond well with the known facts that the excess Si has very little effect on the *ns.*, but considerable upon the sp. gr., at least in types near the compn. of åkermanite. L. W. R. (*C. A.*)

The chemical constitution of silicates. B. GOSSNER. *Centr. Mineral. Geol.*, **1924**, 97-106, 129-40.—The formula for *clinochlore* is written: $(\text{SiO}_2.2\text{SiO}_3\text{Mg}).\frac{3\text{AlO}_2\text{H}}{3\text{MgO}_2\text{H}_2}$. Mutual replacement to a moderate extent between SiO_2 and AlO_2H and also between AlO_2H and MgO_2H_2 enable G. to account for all the members of the chlorite group. Twenty analyses are recalc'd. to illustrate this new conception. J. E. C. (*C. A.*)

The crystal habit of potash feldspars considered from a minerogenetic standpoint.—G. KALB. *Centr. Mineral. Geol.*, **1924**, 449-60.—A relationship between crystal development and temp. of formation is pointed out. J. E. G. (*C. A.*)

Some moisture relations of colloids. II. Further observations on the evaporation of water from clay and wool. E. A. FISHER. *Proc. Roy. Soc. (London)*, **103A**, 664-75 (1923); cf. *C. A.*, **17**, 2466, 2528.—The study of the evapn. of H_2O from colloidal materials has been extended to kaolin and a ball clay. When the rate of evapn. is plotted against moisture content, the curve for ball clay does not show the curvature previously noted in a clay subsoil and attributed to shrinkage, although the ball clay also shrinks. This type of curvature is found only with materials which are mixts. of colloidal and non-colloidal substances, and is due to the simultaneous evapn. of imbibitional H_2O held by the colloid and of interstitial H_2O held as H_2O wedges between the soil grains. The former H_2O evaps. at a practically const. rate, while the latter evaps. at a rapidly diminishing rate. The bearing of these results on the evapn. of H_2O from wool fabrics is discussed. F. L. B. (*C. A.*)

An attempt to cheapen the production of zirconium dioxide. J. W. BAIN AND G. E. GOLLOP. *Can. Chem. Met.*, **7**, 35-8(1923).—Brazilian zirkite runs 70 to 80% ZrO_2 ; only 55 to 65% of the Zr is actually present as ZrO_2 ; the remainder is silicate. In the Florida zirconia sands there is more Zr silicate and hence these sands are harder to treat. By passing dry Cl_2 or COCl_2 over heated Zr-bearing ore mixed with C, ZrCl_4 can be volatilized and pure ZrO_2 can be prep'd. therefrom. The reaction is slow; the yields for Cl_2 are far from theoretical; and the process is difficult to carry out commercially. Fusions with (a) NaOH , (b) Na_2CO_3 , (c) niter cake and (d) KHF_2 are described in *C. A.*, **15**, 3952. Of the soln. methods the best employs 66° Bé. H_2SO_4 . By using 2 pts. H_2SO_4 to 1 pt. ore and heating to approx. 275° for 1 hr., 1-7% of the ZrO_2 in some

Brazilian ore is brought to soln. Higher temps. and longer time did not increase the yield. The usual methods of producing a pure ZrO_2 from the H_2SO_4 soln. are too expensive for com. work. After extg. the residue with hot H_2O , the ZrO_2 can be pptd. by boiling as basic sulfate (Pugh's pat. U. S. 1,316,107). To reduce the free H_2SO_4 to approx. half that of the ZrO_2 present, addn. of (1) $CaCO_3$, (2) $CaCl_2$ and (3) $CaCO_3 + CaCl_2$ were tried. B.'s and G.'s expts. show that Zr is retained by the pptd. $CaSO_4$, and that great dila. is necessary to bring down the ZrO_2 in appreciable amt. by boiling. By suitably adjusting the concns. and dilg. the filtrate about 40 times before boiling, about 75% of the ZrO_2 in soln. can be pptd. The ppt. merely requires washing and ignition. One sample so obtained gave on analysis 98.6% ZrO_2 . E. G. R. A. (C. A.)

Silicon in aluminium-silicon alloys. J. D. GAT. *Ind. Eng. Chem.*, **16**, 959-60 (1924).—Graphitic Si is more or less oxidized during the treatment of Al alloys with acid and subsequent heating to dehydrate SiO_2 . To det. Si in an alloy, treat 0.5 g. in a 50 cc. Fe crucible with 2 g. NaOH and 1 cc. water. When the action abates, add 9 cc. of water and heat on the hot plate. Transfer finally to an evapg. dish and rinse the crucible with water, then with 35 cc. of acid mixt. (300 cc. concd. H_2SO_4 , 300 cc. water, 300 cc. concd. HCl and 100 cc. concd. HNO_3) and then with water. Evap. to dryness and fume strongly for 5 min. Cool, take up with 50 cc. of 3 N H_2SO_4 and boil. Filter, ignite, weigh and test the purity of the SiO_2 with HF. W. T. H. (C. A.)

PATENTS

Base-exchange silicate and process of preparing same. YONG K. LEE. U. S. 1,527,199, Feb. 24, 1925. The process of prep. a base exchange silicate, which comprises forming a coating upon carrier particles having base exchange capacity, from sodium silicate and aluminum sulphate and baking, which coating will increase base exchange capacity of such particles.

Process of making zirconium oxide. HUGH S. COOPER. U. S. 1,527,470, Feb. 24, 1925. Process of prep. coarsely powdered zircon for decomposition by fused caustic soda which comprises heating the zircon to a red heat and quenching it.

Purification of clay. WILLIAM FELDENHEIMER and WALTER WILLIAM PLOWMAN. U. S. 1,526,971, Feb. 17, 1925. The process for the purification of clay which comprises effecting peptonization of the clay with a dilute aqueous solution of caustic alkali and alkaline-earth hydrate.

Vitreous material. FREDERICK G. KEYES and CHARLES A. KRAUS. U. S. 1,526,423, Feb. 17, 1925. A vitreous material composed of silica qualified by boric anhydride.

Manufacture of chromates. LOUIS CHARLES DREFAHL. U. S. 1,526,325, Feb. 17, 1925. Process of oxidizing chromium compounds which comprises blast roasting a mixture of the same with a carbonaceous fuel and a compound of an alkali forming metal at a temperature in the neighborhood of $1500^\circ F$.

General

Ceramic engineering courses in Canadian universities. ANON. *Contract Rec. and Eng. Rev.*, **39**, 86(1925).—Clay products manufacturers, individually and through the Canadian National Clay Products Association, have endeavored for years to establish courses in ceram. eng. in Canadian univ., with result that the Univ. of Sask. had its 1st graduation of ceramic engineers last year; and the establishment of a ceram. course in Univ. of Toronto now seems assured. To the late JOSEPH KEELE, the clay products manufacturers of Canada acknowledge their everlasting gratitude for his activity in promoting these ceram. courses. O. P. R. O.

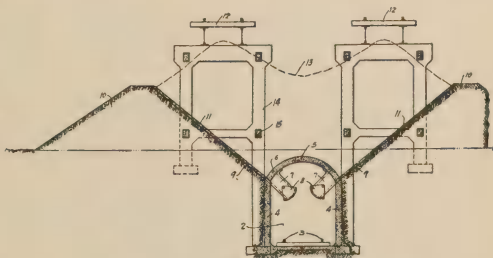
Marketing of high grade clays. FELIX E. WORMSER. *Eng. Min. Jour.-Press*, **119** [4], 163-8(1925).—Each clay has its own marketing problems. The phys. prop-

erties of the clay to be marketed should be carefully looked into. It should be subjected to tests to determine its plasticity, shrinkage, color, fineness and its behavior under firing at various temps. With this information it can be stated as to what use the clay can be put. It is a difficult matter to put a new clay on the market as the consumers, through long association with clays from certain localities, are reluctant to make any change. Also, domestic clays have strong competition from Europe, so much so that a tariff on foreign clays is enforced. Bentonite is coming into wide use as a clay. It has the property, when moistened, of absorbing about three times its weight of water. It is used chiefly as a cosmetic and in paper manufacture. A table is given showing detailed amounts of clay used in different consuming branches of indus., together with data on the classification and physical properties of clays. A. H. K.

Tests of a powdered-coal plant. H. KREISINGER, J. BLIZARD, C. E. AUGUSTINE AND B. J. CROSS. Bur. of Mines, *Tech. Paper* 316, 22 pp.(1923); cf. C. A., 17, 621.—Two boiler, eight mill, and six drier tests were made at a pulverized-coal plant. A good quality southern Illinois bituminous coal was used which was shipped as screenings and contained little slack on delivery. Complete data on the Lopolco furnace, two 3 pass Stirling boilers, superheater, crusher, drier, mills, separator, conveyor, and methods of conducting the tests are given, accompanied by explanatory drawings. The results of the tests are summarized in 8 tables, 4 sets of temp. curves of the furnace gases with the boilers operating at from 102 to 202% of rating, 3 graphic logs of parts of the boiler tests, and a curve showing that the temp. of the flue gas increased from about 495°F with boilers at 100% rating to 640°F at 212% rating. The authors conclude that the results compare favorably with stoker performances under similar conditions. Overall-thermal efficiencies of from 72.6 to 78.2% and boiler efficiencies of from 74.4 to 78.8% were obtained at boiler ratings of 202 and 155%, resp., with CO₂ at 12.9 and 13.6%. The m. p. of the ash (from the Illinois coal used) was so low that when an attempt was made to run the plant on low excess air with high CO₂ in the flue gases the furnace temp. became so high the ash at the bottom of the furnace melted. It could not be removed while the furnace was in operation. The molten ash also caused excessive erosion of the furnace walls. A comparison is made with tests on 4 pass Stirling boilers set in hollow furnace walls. In these tests the temp. of the flue gases was 130°F lower with resulting heat losses of 7 to 10% instead of 12 to 15% as in the present tests. Radiation losses were also 1½% lower (see *Ceram. Abs.*, 2 [5], 116 (1923)). W. W. H. (C. A.)

PATENT

Storage structure. ALLAN HARVEY WOODWARD. U. S. 1,527,288, Feb. 24, 1925. A storage bin structure comprising a tunnel, a track in the tunnel for a collecting car, a cover over the tunnel having gate controlled chutes along each side, a bin formed above the cover and having continuous stock supporting banks sloping upwardly with a uniform pitch from the tunnel on each side, said walls being formed in part below ground level by the ground walls of the tunnel cut that slope to the tunnel and in part above ground by embankments formed by the spoil from the tunnel, and a concrete facing for said banks which slopes continuously and uniformly at such an angle as to feed by gravity all mat. resting thereon to said chutes.



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Abrasives

Natural abrasives (Can.). V. L. EARDLEY-WILMOT. Can. Inst. of Min. and Met., *Bull.* 155(1925).—Grindstones, scythestones and pulpstones; production, producing localities with statistical table, 1909–1923; prospecting producing areas; mining and methods of prepn. for market; uses and disposition; and prices and present market conditions are discussed. The econ. factors of garnet, corundum, volcanic ash, pumice, and diatomaceous earth in Canada are further surveyed by W. O. P. R. O.

Abrasives. ANON. *Imp. Min. Resources Bur.* (1925).—Abrasives (1920–1922). O. P. R. O.

PATENTS

Antislip floor. FRANK J. TONE. U. S. 1,528,638, Mar. 3, 1925. An antislip floor or tread having embedded in fragments of a self-bonded mass of abrasive grains united without a separate binder under high temp.

Aluminous abrasive material and method of making the same. FRANK J. TONE. U. S. 1,528,639, Mar. 3, 1925. A mass of aluminous abrasive grains united to each other by fluxed portions of their matrix mat. the grains retaining their individual charac.

Dressing of smelted, artificial abrasives. HUGO VIERHELLER. Ger. Pat. 399,725. *Chem. Zentralblatt*, 2 [14], 1844(1924). Sulphite liquor is distributed in the hydrous dispersion medium and, after fractionating, the sepn. in flakes of the elutriated mat., which is still suspended, is obtained by adding permanganate or alkali. The method allows to sep. abrasives in various sizes. W. S.

Art

Note on the use of fluorspar in leadless glazes. J. W. MELLOR. *Trans. Ceram. Soc.* (Eng.), 23, 178(1924).—Small scale expts. made by M.'s students indicate that the standard leadless glaze can be softened by the replacing part of the lime, up to about 6%, by fluorspar and cryolite. Care must be taken in using fluorides in glazes since under conditions not definitely detd. at present they may produce blisters. H. F. S.

Some old directions for making the purple of Cassius and vitreous enamel pigments. WILHELM FROMMEL. *Chem.-Zig.*, 48, 777(1924).—Directions for making various prepn. used in the art glass industries, contained in a manuscript dated 1835, are quoted literally. Urine is prescribed as the reducing agent for making Cassius purple. Yellow glaze consisted of red lead and sand; green glaze, of MnO₂, Pb₃O₄ and sand.

F. A. W. (C. A.)

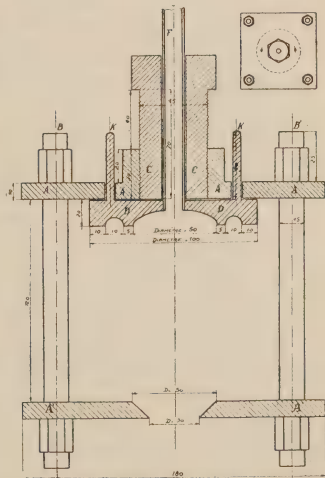
PATENTS

Titanium hydroxide and pigments. J. BLUMENFELD and C. WEIZMANN. Brit. Pat. *Oil and Colour Trades Jour.*, **67**, 618(1925).—The hydrolysis of solns. of titanium sulphate for the production of titanium hydroxide is effected by adding a titanium soln. to another of different concn. or to water and allowing diffusion to take place for several min. before complete mixing is effected. In an example a paste of titanium sulphate crystals is introduced into twice its vol. of boiling water and is maintained at boiling temp., the mixing being effected after 3 to 5 minutes. The hydrolysis is effected in about half an hour. In another example a strong soln. of titanium sulphate is introduced little by little into half its vol. of boiling water and afterwards stirred, the temp. being maintained near the b. p. The hydrolysis is effected in about 1 hr. The process may be effected in presence of other subs. which it is required to incorporate with the titanium hydroxide for the production of pigments, and such subs. may be prepd. sep. or in the app. in which the hydrolysis is effected. The subs. mentioned are barium sulphate, calcium sulphate and silica. O. P. R. O.

Manufacturing of metallic coats by firing in solutions of speculum metal. EMIL REINHOLD EICHLER (Dresden). Ger. Pat. 401,737, *Chem. Zentralblatt*, **2** [22], 2550 (1924). The soln. employed contains a mixt. of organic Cu-, H_3BO_3 -, Bi and Pb-compds. and is fired in at temp. of 330–470°C; copper colored coats are obtained. To produce gold or silver similar coats the soln. contains besides the compds. mentioned organic Ag-Ni and Sn compounds. As organic ingredients serve resin, sulphurous resins, etc. W. S.

Cement, Lime and Plaster

Testing the permeability to water of mortars, brick, stone. F. ANSTETT. *Rev. Mat. Constr. Trav. Pub.*, **183**, 309–13(1924).—Permeability of a subs. is the property characterized by the actual passage of fluids through it, whereas porosity merely indicates the presence of voids and pores which may be filled up with fluids. A. indicates the older methods of detg. permeability as prescribed by the (French) Commission of Testing Methods in 1891, 1894 and 1900, in which a glass tube was cemented into place in a block of the mat. to be tested. Water in the tube was kept at a const. head, and the permeability was expressed by the number of ls. of water flowing per hr. through a cubic block of definite dimensions. Later the TISSIER app. was developed for detg. permeability of many building mats. under varying conditions of water press. Two parallel plates A and A' are held rigidly in place by 4 bolts B. A copper tube F, soldered to the circ. metal piece D leads the water to the specimen clamped between D and A'. Thick rubber gaskets prevent the specimen from coming directly in contact with the metal. The specimen is usually 10 to 11 cm. square and 8 cm. thick. Water under definite press. is applied to the specimen through F, and the quantity which passes through the specimen is collected by a funnel in a graduated vessel situated below the app. L. N.



Experiments on the setting of Portland cement. JULES CARTIAUX. *Rev. Mat. Constr. Trav. Pub.*, **184**, 1–3(1925).—(1) *Free lime content.* Port. cement was mixed

with 10% sugar soln. The soln. of the free lime, in preventing the re-solution of the calcium aluminate, retarded the set almost completely. The free lime amounted to 4.2% CaO. The stability of vol. was poor. (2) *Sol. salts.* Fifty gms. of Port. cement were suspended in water to dissolve the sol. salts, and then filtered. The insol. matter after being dried at 100°C did not set, and on standing whitened due to carbonization. After 3 days the CaCO_3 content was 26%, after 3 months 31%. The sol. salts when mixed with the insol. matter did not induce the process of setting. (3) *Influence of air.* The initial and final periods of set were slightly prolonged when the Port. cement was allowed to set under mercury, that is, not in contact with the air. (4) *Influence of CO_2 .* Similar results were obtained when Port. cement was allowed to set in an atmosphere free of CO_2 . The stability of vol. in both cases was perfect. The outer coating of a test specimen after 1 month's exposure to the air contg. CO_2 corresponding to 32% CaCO_3 , after 8 months 42.5%, after 5 years 80%. The interior of the piece after 5 years' exposure yielded but 5.5%. (5) *Weight loss study.* One hundred g. of Port. cement mixed with 26 g. of distilled water were held on a watch glass on a balance pan, to det. the rate of evapn. of water, and the absorption of CO_2 . Four mins. after the time of mixing, loss of wt. was .05 g., from 4 to 20 mins. .01 g. per min., from 20 to 60 mins. .01 g. every 2 mins., from 60 to 150 mins. .01 g. every 3 mins., from 150 to 235 mins. .01 g. every 4 mins., from 235 to 240 mins. the loss dropped to .01 g. per min. as at the beginning, and here corresponded to time of initial set. From 4 hrs. to 4 hrs. 23 mins. loss was .01 g. per min., 4 hrs. 23 mins. to 4 hrs. 29 mins. .01 g. every 3 mins., 4 hrs. 29 mins. to 7 hrs. .01 g. every 4 mins., 7 hrs. to 7 hrs. 19 mins. .01 g. every 2 mins. At this point the Vicat needle did not penetrate, corresponding to the completion of set. 7 hrs. 19 mins. to 7 hrs. 24 mins. loss .01 g. every 4 mins. After 3 months the original wt. of 126 g. decreased to 118.05 g. (loss of about 6%). The initial set took place after a loss of 0.63 g. (0.5%), and the final set after a loss of 0.8–1.0 g. (0.7%). The increase in wt. due to the absorption of CO_2 was for the period 3–5 months .28 g., 5–11 months .20 g., 11–26 months .43 g., 16–24 months 1.13 g., giving a final wt. of 120.25 g. At this time the cement specimen contd. CO_2 , the equiv. of 6% CaCO_3 .
L. N.

French specifications for slag cements. ANON. *Rev. Mat. Constr. Trav. Pub.*, 185, 41–2(1925).—The foll. are the technical requirements of slag cements to be used in marine construction, issued by the Minister of Public Works in a circular dated Sept. 2, 1924. *Definition.* The slag cement shall consist of a mixt., properly proportioned and thoroughly mixed, of carefully slaked and bolted hydraulic lime and blast fur. basic slag, finely ground. *Chem. compn.* The cement shall not contain more than 5% MgO, 12% Al_2O_3 , 2.5% Fe_2O_3 , 2% sulphur. Ignition loss at white heat shall not be more than 5%. The index of hydraulicity, that is the ratio of wts. of silica and alumina as against the wts. of lime and magnesia shall be less than 0.70. *Fineness.* The cement shall at the most have a residue of 12% by wt. on a screen 4900 mesh per sq. cm., and 2% on 900-mesh. *Apparent d.* A liter of cement shall weigh at least 900 g. *Duration of set.* The cement immersed in potable water shall not begin to set before 1 hr. has elapsed. The final set shall not take place before 3 hrs. nor after 24 hrs. have elapsed. *Tensile strength of pure cement.* Briquettes immersed in sea water for 24 hrs. shall have a minimum tensile strength per sq. cm. of 18 kg. at the end of 7 days, 25 kg. in 28 d. In addition the tensile strength shall increase at least 3 kg. between 7 and 28 d. *Tensile strength of mortar.* Briquettes of the mortar immersed in sea water for 24 hrs. shall have a minimum tensile strength per sq. cm. of 8 kg. at the end of 7 days, 18 kg. in 28 days. Besides the strength shall increase at least 2 kg. between 7 and 28 days. *Hot and cold deformation tests.* Pats and briquettes shall be kept in a humid atmosphere for 24 hrs. and the pats shall then be immersed in sea water. The temp. of the hot deformation test for the briquettes shall be maintained at 100° for 3

hrs. The increase in length of the stand. spacing between two needle points shall not be more than 5 mm. L. N.

French specifications for aluminous cements. ANON. *Rev. Mat. Constr. Trav. Pub.*, **185**, 42(1925).—The foll. are the tech. requirements of aluminous cements to be used in marine construction, issued by the Minister of Public Works in a circular dated Sept. 2, 1924. *Definition.* Aluminous cement shall be produced by hgtg. a mixt. of alumina, silica, iron oxide and lime or calcium carbonate; and grinding the product. *Chem. compn.* The cement shall contain at least 30% Al_2O_3 by wt. It shall not contain more than 2% MgO nor more than 1% sulphur. The index of hydraulicity, that is the ratio between the wts. of silica and alumina as against the wts. of lime and magnesia shall be less than 1. *Fineness.* The cement shall at the most have a residue of 20% by wt. on a screen with 4900-mesh per sq. cm. *Apparent d.* A liter of cement shall weigh at least 900 g. *Duration of set.* The cement immersed in potable water shall not begin to set before $\frac{3}{4}$ hr. has elapsed and the set shall be complete in 7 hrs. *Tensile strength of mortar.* The briquettes immersed in sea water for 24 hrs. shall have a minimum tensile strength per sq. cm. of 27 kg. at the end of 2 days, 28 kg. in 7 d., and 29 kg. in 28 d. *Hot and cold deformation tests.* Pats and briquettes shall be kept in a humid atmosphere for 24 hrs., and the pats shall then be immersed in sea water. The temp. of the hot deformation test shall be 100° , and maintained for 3 hrs. The increase in length of the stand. spacing between two needle points shall not be more than 1 mm. L. N.

High early-strength Portland cements in Germany. G. HAEGERMANN. *Eng. News-Rec.*, **93**, 910–1(1924); *J. Soc. Chem. Ind.*, **44B**, 100–1(1925).—Ordinary Port. cement occupies a position intermediate between the hydraulic limes, which slowly but speedily increase in hardness, and the alumina cements, which reach max. strength in a few days. The tensile strength of high-alumina cement, or "alcement," is low compared with the compressive strength. Alcement is highly resis. to sea-water and water contg. gypsum, but is less resis. to alkali sulphates, and it deteriorates under the action of acids. If it is mixed with other cements, or is superimposed upon concrete made with Port., disintegration occurs. Attention is therefore directed to the prodn. of high early-strength Port. cement. The compn. is so selected that the cement has a high lime cementation index (0.99 Newberry). Small quantities of iron ores may be added to facilitate sintering and to increase vol. stability. The finest pulverization and intimate admixt. of the ingredients are essential. On a 10,000-mesh 8–13% should remain, and on a 4900-mesh 2–6%. From 3–4% of gypsum should be added. Port. cements have thus been made, surpassing the tensile strength of alcement, and almost attaining the early-strength. The initial temp. influences the early-strength, an interval of 5° lowering it by 10% after a 2-day test. H. H. S.

Mortar strength, a problem of practical statistics. J. W. GOWEN, H. W. LEAVITT AND W. S. EVANS. *Proc. Nat. Acad. Sci.*, **11**, 11–6(1925).—Seven-day and 28-day tests were conducted according to the standard A.S.T.M. procedure on 478 Maine sands in tension and 166 in compression. The following relations were developed between the 2 tests:

| | |
|--------------------|--------------------------------|
| Tension (lbs.) | $T_{28} = 1.06 T_7 + 51.5$ |
| Compression (lbs.) | $C_{28} = 1.128 C_7 + 793$ |
| Tensile Ratio | $T-R_{28} = 0.87 T-R_7 + 5.6$ |
| Compressive Ratio | $C-R_{28} = 0.49 C-R_7 + 50.7$ |

Predictions of the 28-day test may be made from the 7-day test by these formulas. As a margin of security, a definite lower limit in strength may be calcd. from the following table, which is obtained according to the theory of error from the standard deviation of the actual 28-day test. *Tension.* 50% of the tests will be above T_{28} ; 75% above

T_{28-29} ; 90% above T_{28-55} ; 99% above T_{28-100} lbs. *Compression*. 50% will be above C_{28} ; 75% above C_{28-416} ; 90% above C_{28-801} ; 99% above $C_{28-1447}$ lbs. *Tensile ratio*. 50% will be above $T-R_{28}$; 75% above $T-R_{28-11.7\%}$; 90% above $T-R_{28-22.6\%}$; 99% above $T-R_{28-40.8\%}$. *Compressive ratio*. 50% will be above $C-R_{28}$; 75% above $C-R_{28-13.5\%}$; 90% above $C-R_{28-26.1\%}$; 99% above $C-R_{28-47.1\%}$. H. H. S.

Recent developments in the cement industry. C. H. DESCH. *Jour. Soc. Chem. Ind.*, **44**, 166(1925).—The setting of wetted cement is due to the decompn. of the aluminates into colloidal alumina, and of tricalcium silicate into mono-calcium silicate and Ca(OH)_2 which last slowly crystallizes in a colloidal matrix. The Roman practice of adding "pozzolana," a decomposed volcanic ash found at Pozzuoli, to mixt. of lime and sand has given the name "pozzolanic materials" to subs. added to give increased strength to cements, and blast-furnace slags are now utilized for resistance to sea-water and to heat. "Cement-fondu," made from bauxitic clay, can be recognized by its high content of metallic iron. Owing to its low silicate content, it reacts quickly with water and is favored as a road surface mat. H. H. S.

Testings on the influence of frost upon concrete. K. HABERKALT AND K. NAEHR. *Z. Verein deutsch. Ing.*, **68** [47], 1232(1924). W. S.

Hydraulic binding agent. FR. MÜLLER. *Chem. Zentralblatt*, **2** [22], 2551(1924). W. S.

German research on high-alumina cements. C. R. PLATZMANN. *Rock Products*, **27**[19], 23-5(1924).—*Conclusion*. Aluminates high in CaO are quick-setting while those low in CaO are slow-setting, and hydration of the latter depends upon the formation of hydrated Al_2O_3 and hydro-Ca aluminates. The high initial strengths are ascribed to the formation of a large proportion of colloidal substances and completeness of the hydration of the aluminates. A table of compressive strengths is given together with chem. compn. and sintering temp. (C. A.)

PATENTS

Furnace for firing, agglomerating, etc., of lime, gypsum, cement, ores, etc. OTTO LEO BORNER (Zürich). Ger. Pat. 401,718, *Chem. Zentralblatt*, **2** [22], 2549(1924).—The fur. case is put in swinging movement. The mat. is placed on a spiral inside the casing and passes from the top to the bottom by swinging the whole fur. around the vertical axle of this spiral. The firing zone is provided in a section preceding the last one, thus forming a cooling zone in the last section of this spiral. W. S.

Cement composition. GEORGE WITTY. U. S. 1,529,228, Mar. 10, 1925. A cement compn. consisting of gypsum, coarse silica, dextrin, saw-dust, barium sulphate and barite.

Enamels

Study your fuel problem closely. R. M. ONON. *Ceram. Indus.*, **4** [2], 110(1925).—The relative advantages and disadvantages of coal, oil, gas and electricity as fuels in the enameling indus. are discussed. P. D. H.

Insulation increases furnace efficiency. E. B. PRENTICE. *Ceram. Indus.*, **4** [2], 110-1(1925). P. D. H.

Urges fair furnace comparison. A. D. DAUCH. *Ceram. Indus.*, **4** [2], 111-2(1925). P. D. H.

Well-insulated doors boost furnace production. J. E. HANSEN. *Ceram. Indus.*, **4** [2], 112(1925). P. D. H.

New smelter and drier combination. ANON. *Ceram. Indus.*, **4** [2], 156(1925).—A double smelter is described in which the ground and cover coats are fritted, one at either end. P. D. H.

PATENT

Enamel for metals or earthenware. I. TRAUBE. Brit. 221,830, Sept. 14, 1923. Any suitable glazing mat. is formed into a thick mixt. with an aq. soln. of compds. which will form ppts. remaining insol. at fusing temps., *e. g.*, a soln. of K chromate and a soln. of MnSO_4 may be mixed with sep. portions of the glazing mat. and the masses thus formed applied superposed or side by side. Fe oxide, chrome green or the like may be used to produce mottled effects. (C. A.)

Glass

The binary system of metasilicate-silica. G. W. MOREY AND N. L. BOWEN. *Jour. Phys. Chem.*, **38** [11], 1167-79(1924).—An investigation of the m. p. relations in the binary system sodium metasilicate-silica. The raw mats. used were quartz and sodium carbonate. The mats. were mixed in the desired propn. and melted in platinum. When the glass appeared clear and free from bubbles it was quickly cooled. The results of the invest. are given in the table.

TABLE I

| Designation | Analysis | | Mol % Na_2SiO_3 | Mol % SiO_2 | Melting point | Solid phase |
|-------------|-----------------------|----------------|------------------------------------|-------------------------|------------------|------------------------------------|
| | Na_2O | SiO_2 | | | | |
| 2154A | 50.40 | 49.44 | 99.23 | 0.77 | 1086.5 | Na_2SiO_3 |
| 2330A | 45.88 | 54.03 | 82.32 | 17.68 | 1031.0 | Na_2SiO_3 |
| 2142A | 44.92 | 54.93 | 79.27 | 20.73 | 1001.0 | Na_2SiO_3 |
| 2115A | 39.55 | ..... | 63.42 | 36.58 | 863.0 | Na_2SiO_3 |
| 2512A | 37.83 | ..... | 60.85 | 39.15 | 847.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2144A | 37.59 | 62.29 | 58.48 | 41.52 | 859.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2510A | 35.90 | ..... | 54.29 | 45.71 | 871.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2518A | 34.04 | ..... | 50.03 | 49.97 | 873.5 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2414A | 33.99 | ..... | 49.91 | 50.09 | 873.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2034A | 33.26 | ..... | 48.44 | 51.69 | 872.5 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2411A | 32.83 | 67.25 | 47.32 | 52.68 | 868.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2530A | 29.20 | ..... | 39.97 | 60.03 | 831.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2530B | 27.32 | ..... | 36.44 | 63.56 | 802.0 | $\text{Na}_2\text{Si}_2\text{O}_5$ |
| 2530C | 25.78 | ..... | 33.27 | 66.73 | 830.0 | High quartz |
| 2520A | 24.81 | ..... | 31.99 | 68.01 | 841.0 | High quartz |
| 2429A | 19.54 | ..... | 23.55 | 76.45 | 1145.0 | Tridymite |
| 2429B | 11.67 | ..... | 12.51 | 87.49 | 1457.0 | Tridymite |
| 2431A | 4.07 | ..... | 5.12 | 94.88 | 1596.0 | Cristobalite |

A comparison was made of the systems formed by SiO_2 with the metasilicates of lithium, sodium and potassium. The metasilicates of these showed a uniform diminution of m. p. with increasing at. wt. Li_2SiO_3 mtg. at 1201° , Na_2SiO_3 1088° and K_2SiO_3 976° , their disilicate m. p. being respectively 1032° , 875° . The system Na_2SiO_3 - SiO_2 is of a simple type with one compd., sodium disilicate $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ and no solid solns. The m. p. of Na_2SiO_3 is 1088° and the eutectic Na_2SiO_3 - $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ is at 840° , 62.5 mol % Na_2SiO_3 , 37.5 mol % SiO_2 . $\text{Na}_2\text{O} \cdot \text{SiO}_2$ has a congruent m. p. at 874° and its m. p. curve is characterized by an unusually flat max. The $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ quartz eutectic is at 793° , 35 mol % Na_2SiO_3 , 65 mol % SiO_2 . E. J. T.

Recuperation increases capacity of English tanks. F. W. HODKIN AND W. E. S. TURNER. *Ceram. Indus.*, **4** [2], 106(1925).—(Excerpt taken from a paper read before the Society of Glass Technology.) The air for combustion is prehtd. first by passage through the flues, the arches of which support the bottom of the tank, and which are superimposed on other flues through which the products of combustion pass in an

opposite direction. The air is prehtd. further by passage through the space between the false crown and the main crown of the fur. One advantage claimed for this type of fur. is the reduction in the cost of construction by the reduction of the excavation needed due to the absence of regenerators. Approximately .8 of a ton of coal is consumed by the producers and boilers per ton of finished glassware. Another unique feature of the tank is the double bridge which has 3 walls sepd. by cavities through which steam is blown for cooling the blocks. The life of the bridge blocks is very much longer. The bridge inspected had been in opern. without repair for 14 mos.

P. D. H.

Information on window glass tank block. JAMES L. CRAWFORD. *Ceram. Indus.*, 4 [2], 107(1925).—The sizes of tank blocks trued for an 8, 12, 15 and 18 in. wall are given. The window glass indus. usually uses blocks trued for an 18 in. wall. Dimensioned sketches show a "throat" block for the open bridge wall and a "floaters" which is used instead of a "throat" in window glass tanks. Several oil-fired recuperative tanks are in use and working satisfactorily. As long as fire clay is used for lining tanks it is doubtful whether they can be insulated successfully at the mtg. end. P. D. H.

Innovations for making hot repairs. THOMAS B. HART. *Ceram. Indus.*, 4 [2], 107-8(1925).—The use of ports on the machine end of a continuous tank fur. is advocated. The design of furs. in such a manner as to permit of complete and separate control of the firing of the mtg. and mach. end is also advocated. A dividing arch leading the gas and air from the induction flues into the mixing chamber; slag pockets in each regenerator to prohibit the checkers from slagging up; and a manhole in the back of each regenerator to facilitate hot checker repairs are also points which are well covered in complete dimensioned drawings.

P. D. H.

The conductivity of annealed and unannealed soda-lime glasses. M. J. MULLIGAN. *Trans. Roy. Soc. Canada*, 18 [3], 120-1(1924).—The condy. of annealed and unannealed soda-lime glass was found to exhibit a marked difference (approx. 200%). The condy. is the same kind of function of the temp. in both cases, so that the change in glass brought about by annealing is one of deg. rather than of kind. Determinations were made of the wts. of mats. that were electrolyzed into these glasses at 180°C from a molten anode (KNO_3 and AgNO_3). The amts. were approx. inversely proportional to the resist. of the glasses, but the depth of penetration of Ag ions does not bear out the assumption that there is a marked difference in the degree of ionization of the two glasses. The major factor in increasing resist. by annealing is a decrease in the mobilities of the ions.

H. H. S.

The sorption of water by soda-lime glass. J. W. REBBECK AND J. B. FERGUSON. *Trans. Roy. Soc. Canada*, 18 [3], 122(1924).—The gas produced when soda-lime glass is electrolyzed under certain conditions was previously found to be derived from the sorbed moisture. Properly annealed tubes were found to yield little or no gas. A number of such tubes were exposed to moisture under a variety of conditions and then electrolyzed. In general the glass appeared to take up moisture from the air slowly, but if the exposure is continued for a very long time the gas-evolving property becomes entirely restored. Soaking the glass in hot water for some hrs. also restores the property. Washing the glass with distd. water, removing this water rapidly by pumping and then filling by distn. the glass tube with mercury and electrolyzing in the usual manner, caused a definite amt. of gas to form. The rate of evolution of the gas was, however, so slow that it seems reasonable to assume that even this small quantity was partly absorbed. This conclusion is in agreement with modern theories of adsorption which postulate that adsorbed films are very thin.

H. H. S.

Glass melting furnaces. (Discussion, Jan. 21, of Soc. Glass Tech.) *Jour. Soc. Chem. Ind.*, 44, 169-70(1925).—The subject was introduced by papers from

J. S. ATKINSON and T. TEISEN. A. described the Stein recuperative pot furnace, the Unit pot furnace, the Torpedo tank and continuous leers. T. discussed the cross flame regenerative tank fur., comparing it with the open-hearth steel furnace. He opined that in small and medium-sized tanks, high thermal efficiency may be attained by use of the recuperative type. He proposed an all-steel accessible bridge cooled by water so that the molten glass should freeze round it and form a glass bridge. H. H. S.

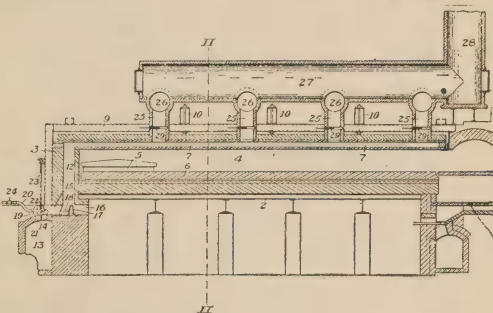
Silvering glass. A. STETTACHER. *Tech. Ind. Schweiz. Chem.-Ztg.*, 1924, 165-6.—S. gives a practical glassworker's recipe for silvering which appears to give very certain results. The distinguishing feature appears to be that only a "few drops" of the reducing soln. are used. (C. A.)

Joint committee for the standardization of scientific glassware. *Chemistry & Industry*, 43, 913-5(1924).—In their report the Comm. unanimously recommended the *liter (l)* and *milliliter (ml)* as the standard units of vol., and that standard volumetric glassware be graduated in terms of these units and marked *ml* instead of *cc*. Reasons in support of the decision are given at some length. (C. A.)

PATENTS

Glass. Coating processes. A. S. CACHEMAILLE. *Brit. Pat. Oil & Color Trades Jour.*, 67, 618(1925). Siliceous or vitreous articles, such as elec. light bulbs, are given an insol. coating by applying a prepn. contg. a sol. silicate, htg., and applying a neutral fixing soln. of an ammonium salt which reacts with the prepn. to form an insol. compd. The prepn. may comprise kaolin, pigments, and sodium or potassium silicate, which may be applied by spraying or dipping. The article is heated to 150°C for about 2 min., and then preferably dipped into a hot (75-115°C) saturated soln. of ammonium chloride or sulphate, whereby silica is pptd. The article is finally washed and dried. Instead of applying the fixing soln. hot, it may be applied cold, and the article subsequently reheated. O. P. R. O.

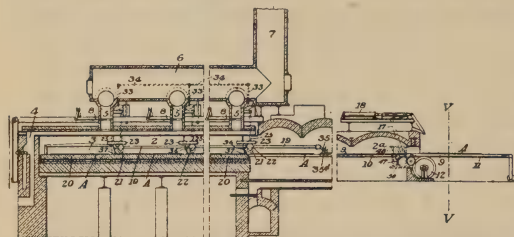
Plate-glass-annealing leer. EDWIN E. MILNER and WILLIAM J. LYTLE. U. S. 1,530,190, March 17, 1925. An annealing leer having a muffle chamber at the oven end and a leer end in line with the muffle chamber and communicating therewith, the top wall of the muffle chamber having therein a plurality of longitudinally extending heating flues, substantially as described.



Glass pressing and blowing machine. EDWARD MILLER. U. S. 1,529,661, March 17, 1925. In a mach. for pressing and blowing glass vessels, the combination of a plurality of neck ring molds each composed of horizontally closable sections, a plurality of coöperating body molds each composed of independently horizontally closable sections, a plurality of vertically movable parison molds each adapted to coöperate with a neck ring mold to form a parison, a horizontally slidable carrier for each of said parison molds, a body mold bottom also mounted on each of said carriers and means for automatically shifting said carrier to place one of the parison molds into position for projection into coöperating relation with the sections of one of the neck ring molds and a body mold bottom into coöperating relation with the sections of the body mold of another neck ring mold.

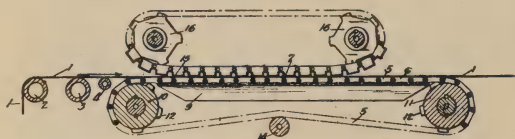
Leer. SAMUEL A. FORTER and ADOLPH H. MEYER. U. S. 1,529,177, Mar. 10, 1925. The combination with a plate glass annealing leer having longitudinally re-

reciprocable pulling rods and vertically movable lifting rods, of mechanism for feeding the glass plates onto said rods, said mechanism comprising longitudinally extending pusher rods operatively connected to said pulling rods to reciprocate therewith and having depending pushing devices, together with means for automatically raising said pushing rods in unison with the lifting rods to permit the return movements thereof, substantially as described.



Apparatus for dipping sheet glass. ROBERT P. CALLARD. U. S. 1,529,239, Mar. 10, 1925. In an app. for dipping sheet glass, a tank containing a liquid bath, an endless conveyor, and a series of individual sheet carriers suspended from the conveyor and successively lowered into and raised from the bath as the conveyor moves above the tank, each carrier comprising an upright frame structure, a lower grooved member for supporting the lower edge of the sheet, and an adjustable latch for engaging the upper edge of the sheet.

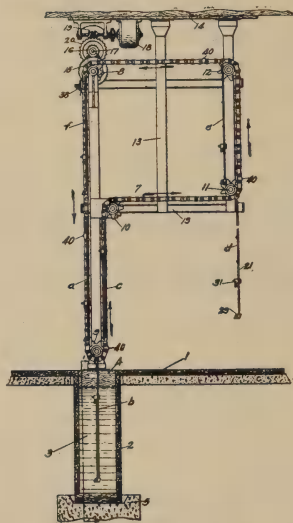
Flattening table for continuous sheet glass. JOHN L. DRAKE and LEWIS D. BLACKSHERE. U. S. 1,529,243, Mar. 10, 1925. A drawing and flattening table for sheet glass, comprising in combination a pair of rotary cylindrical drums, a stationary table positioned between the drums and having a flat upper supporting surface, and a flexible link belt adapted to travel around the



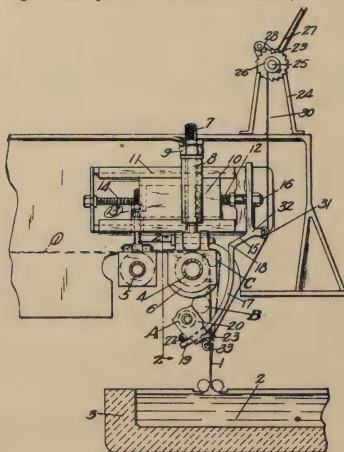
link having a flat upper sheet-supporting surface, and a lower surface of such conformation that the pivot centers of the links will be the same distance from the cylindrical link-supporting surface of the drums, while on the drums, as these centers will be from the flat link-supporting surface of the table, while on the table.

Glass. FRED M. LOCKE and FRED J. LOCKE. U. S. 1,529,259, Mar. 10, 1925. A glass having a low silica content, a high alumina content, the qualities of transparency and high elec. insulation under heat, and contg. an alk. earth oxid.

Changing bending rolls in sheet-glass-drawing machines. JOSEPH M. NEENAN. U. S. 1,529,268, Mar. 10, 1925. An app. for changing bending rollers in a machine for drawing a continuous sheet of glass and deflecting the plastic

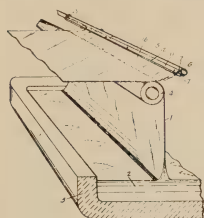
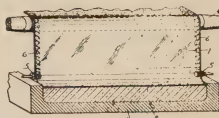


drums and over the table, the belt consisting of a plurality of pivotally connected links, each



sheet about a bending roller, comprising an auxiliary sheet-supporting roller, a pair of guides, one at either side of the machine, each guide extending from a point above and outside of the bending angle of the sheet to a point below and inside of this angle, a bearing for an end of the auxiliary roller movable along each guide, and means for simultaneously moving the bearings so that the auxiliary roller is carried from a position within the sheet angle and out of contact with the sheet, to a sheet-supporting position, the sheet being simultaneously lifted from the bending roller.

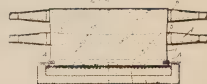
Bending roller for drawn sheet glass. JOSEPH A. REECE. U. S. 1,529,274, Mar. 10, 1925. In an app. for drawing sheet glass, a roller about which the sheet is deflected from one plane to another, the roller comprising sep. end and central portions adapted to travel at different peripheral speeds.



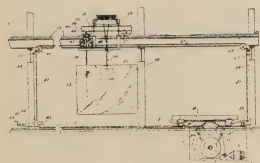
Reheating burner for sheet glass. JOSEPH A. REECE. U. S. 1,529,275, Mar. 10, 1925. In a sheet glass forming apparatus, a rehtg. burner comprising a gas pipe having a longitudinal series of openings in one side, a mixing chamber covering the openings and having a narrow slot in its outer portion opposite the series of openings, and air inlet openings in one side wall of the chamber, and an adjustable valve plate over the air inlets.

Sheet-glass-drawing apparatus. CLIFFORD A. ROWLEY. U. S. 1,529,278, Mar. 10, 1925. In app. for drawing a continuous

sheet of glass from a pool of molten glass, a bending system for the plastic sheet comprising a plurality of rollers, the one about which the sheet is first deflected having a continuously curved sheet-carrying surface which is of larger diam. adjacent the ends of the roller than at the central portion thereof.



Glass-transfer apparatus. JOHN H. FOX. U. S. 1,529,584, Mar. 10, 1925. In combination in a system for surfacing sheet glass, having a track with cars or tables on said track and means for moving the cars along the track, a plate glass transfer and laying frame mounted above the track for movement longitudinally thereof, mech. connections driven from said means for moving the cars, adapted to shift said frame forwardly with the cars at the same rate of speed as the cars, and a motor for giving the frame a movement longitudinally of the track at a higher rate of speed than said movement of the cars.



"Splinterless" reinforced glass sheets. J. Cox. Brit. 221,552, June 8, 1923. In sealing a sheet of cellulose acetate between sheets of glass, the glass is preliminarily treated with a soln. which may be formed of gum kornifan 28 g., nelkin oil 0.5 cc. (to prevent ropiness) and H_2O 112 cc. and the cellulose acetate sheet is treated with $\text{C}_2\text{H}_2\text{Cl}_4$ and HOAc . The sheets are then united under slight pressure at a temp. of about 40° and may be sealed with a cement formed of CaCO_3 75 and boiled linseed oil 25 parts colored with ivory black or other pigment. (C. A.)

Heavy Clay Products

Brick making at the National Capital. ANON. *The Clay Worker*, 83 [1], 24-8 (1925).—The plants are described of the Wash. Hydraulic Press Brick Co.; Wash. Brick and Terra Cotta Co.; West Brothers Brick Co.; and Va. Brick Co. P. D. H.

Timely advice on firing. ANTON VOGT. *The Clay Worker*, 83 [1], 30-1(1925).—The use of draw trials is advocated to det. the end of the watersmoking period; the end of the oxidation period; and the finish of the firing. The method of holding the heat

in the top of the setting by means of draft regulation without overfiring the ware around the bag walls or on top is described fully. The manner of firing to obtain better colored brick or tile is also described. P. D. H.

Fundamental principles in the design of brick and tile as units of structural masonry. FRED T. HEATH. *The Clay-Worker*, 83 [3], 240-3(1925).—The three primary elements to be considered, namely, propn., bond and size, as well as their relationship to each other, are discussed in detail, primarily from the view-point of the builder. For the most efficient design of masonry work, it is shown, with sketches to illustrate, that the basic wall dimensions of the masonry units should conform to common units of measurement. The unit of 4 inches is suggested as a common basic standard because most all masonry forms already very nearly conform to it. P. D. H.

How brick are made in Chicago. ANON. *Brick & Clay Rec.*, 66 [2], 108-16 (1925). P. D. H.

The labor cost in common brick. ANON. *Brick & Clay Rec.*, 66 [2], 120-2 (1925).—Tables are given showing time required and cost in labor of producing soft mud, stiff mud and dry-press brick. P. D. H.

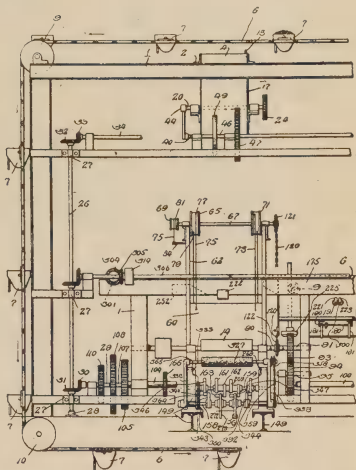
How whitewash can be prevented. H. C. MEYER. *Brick & Clay Rec.*, 66 [2], 128(1925).—The causes of scumming are given and a method of testing for soluble sulphates is outlined. The barium carbonate treatment for the prevention of whitewash or scum is considered the most reliable. Natural barium carbonate is quite as satisfactory as pptd. barium carbonate and is considerably cheaper. P. D. H.

Brick plant economy. D. D. OMUNDSON. *Contract Rec. and Eng. Rev.*, 39, 172 (1925).—(Paper read at Can. Nat. Clay Products Assn.). How utilization of waste heat saves money in a brick plant. The experience of Citadel Brick Ltd., Quebec city: in five years the equipment and its operation were paid for and \$58,000 was saved in the cost of fuel. Experiment demonstrated possibilities of using the heat of a cooling kiln to help another kiln along in the early stages. A waste heat drier was built and all kilns were connected together in such a manner as to permit drying and watersmoking with clean waste ht. and preheating the kilns with combustion gases at high temp. The average distance from the kilns to the waste heat drier is 350 ft. Part of the flue passes over a continuous kiln where it is buried in the filler over the chambers and beneath the firing floor. The flue being divided in order to get sufficient volume, provision was made for picking up all available waste heat from the cooling chambers of this kiln by using special goosenecks. While some plants have experienced cracked ware, with the use of waste heat in drying, due probably to increased humidity where the green ware enters, usually bricks come through in better condition and with less loss than in radiated heat tunnels. The drier is a standard waste heat drier, the induction fan discharging into the tunnel under the car track, the openings going back about half the length of the tunnel and a control damper located at the door of each tunnel. Watersmoking is done with the clean heat of a cooling kiln, and while temp. is seldom over 400°F during this period, the intense draft seems to carry away all traces of moisture. From 24 to 36 hrs. of this treatment has been found to be sufficient, after which the combustion gases of another kiln are used to raise the temp. to as high as 700°F. Thus all the low temp. work is carried on under a comparatively high vacuum without the expenditure of fuel and without damage to the ware. The actual firing time varies from 68 to 84 hrs., depending on the fuel used, size of kiln (these kilns described are 30 and 32 ft.) and the result desired. This compares to the 8½ and 9 days firing time per kiln before installation of these special waste heat driers. In decarbonizing a kiln before raising the temp. to finishing heat the strong induction is of great use in speeding up this process. The rapid turn-over of kilns is one reason for fuel economy, on account of the shorter radiating period. There has not been a case where

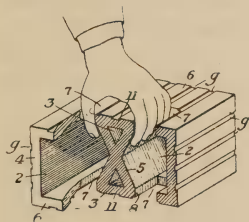
application of these principles of operation has been applied intelligently that any previous established standards of excellence were not only equaled but surpassed, in as much as invariably the induced draft increases the percentage of No. 1 ware. The cost of installing the means to effect changes on a battery of kilns already in existence would vary according to plant layout and local conditions but as an approx. figure, where conditions are not unfavorable and drainage has been previously provided, the cost should be about \$1200 per kiln (32 ft. diam. kiln), exclusive of fans and motors, which should cost approx. \$5000 for a battery of 9 kilns and a waste heat drier. The cost of these features when building a new kiln would be much less than installing them in old kilns. In trying to det. whether or not it is profitable to effect the changes that provide control of your waste heat it is only fair to remember that the productive capacity of the kilns is increased 50%, due to the changes as outlined. O. P. R. O.

PATENTS

Machine for and method of making brick. ROY P. M. DAVIS and IRVIN F. HEPLER. U. S. 1,529,692, Mar. 17, 1925. A brick making mach. comprising a frame, having a hopper therein, means for feeding mud to the hopper, said hopper having gates therein for trapping the mud fed to the hopper, a mold support mounted for oscillatory movement in said frame, an open ended mold carried by the mold support, movable splash plates mounted in the frame adjacent the mold support, means for oscillating the mold support to bring the mold into alinement with said hopper, and means for simultaneously opening the plates of the hopper and for moving said splash plates to operative position. The method of making brick consisting in forming a brick in a mold, mechanically ejecting the brick therefrom, and then subjecting the ejecting means to a rotating shifting brushing action to clean adhering material from the ejecting means.



Hollow tile. HENRY J. F. LUDEMAN. U. S. 1,529,317, Mar. 10, 1925. A hollow tile having



horizontal longitudinally extending voids defined by side and intermediate load carrying walls, said tile having substantially centrally located supplemental openings in overlapping side by side parallel relationship intersecting said voids and forming hand receiving holes, each of said openings having its major axis parallel to the longitudinal axis of the tile, substantially as described.

Process of coloring clay articles. EUGENE L. CHAPPELL. U. S. 1,528,401, Mar. 3, 1925. A process of coloring brick and the like, consisting of passing in contact with the cooling brick, the gasified atmosphere which has passed from the hgt. and prehtg. brick.

Manufacturing of light brick. A. G. BREMEN. Ger. Pat. 401,866. *Chem. Zentralblatt*, 2 [22], 2551(1924). To the slip made of water and small pieces of peat 50% CaO and gypsum are added to destroy the colloidal structure of the peat. During slaking the CaO, the stone remains in a mold under high press. in order to reduce the expansion. The ware is light, cheap, insulating and sound-proof. W. S.

Refractories

Suggestions on boiler furnace design. C. M. GARLAND. *Power*, **61** [5], 176 (1925).—Fur. temp. is intimately related to the combined efficiency, the capacity developed, and the life of the fur. lining. The highest temp. possible consistent with reasonable refrac. life should be maintained. All heat transactions occurring within the fur. and boiler setting will be dependent upon high temp. for the greatest efficiency, and the only limit at the present time is the life of the refracs. Too long life to the refracs. indicates uneconomical operation. Radiation and conduction losses are discussed together with losses caused by stratification of gases and the proper type of stoker to prevent stratification. C. J. H.

Water-cooled furnaces. H. D. SAVAGE. *Mech. Eng.*, **47** [3], 197(1925).—Fur. linings and refracs. have not been keeping pace with the studies being made in other features of power plant development. Higher settings, higher ratings and higher efficiencies now being made have placed a duty upon boiler fur. that cannot be met satisfactorily by the refracs. available, or of common or standard use. This has led to (1) hollow-wall refrac. furs.; (2) steam-cooled walls; (3) water-cooled walls. The completely water-cooled fur. or a combination of water-cooled and refrac. fur. would seem to present the greatest possibilities for future interest. The author deals with a number of water-cooled furnaces of the finned type, or as it is now called, fin. fur. C. J. H.

The relation between ordinary refractoriness, under-load refractoriness, and composition, physical and chemical, of refractory material. Pt. 1. A. J. DALE. *Trans. Ceram. Soc. (Eng.)*, **23**, 217-33(1924).—In htg. fire clay brick made with fire clay grog under constant load with steadily increasing temp., the temp. at which subsidence commences is independent of the grog content. With various brick there is a variable range of temp. between the commencement of subsidence and the point of complete failure. The temp. at which complete breakdown occurs is lower with grogged brick than with straight clays. When grogged brick were tested under load at constant temp., 1350°C, it was found that the greater the propn. of grog, the more rapid the subsidence and the greater its amt. H. F. S.

The influence of texture on the transmission of heat through firebricks. A. T. GREEN. *Trans. Ceram. Soc. (Eng.)*, **23**, 253-70(1924).—The harder the firing of clay brick the lower the true sp. gr. and the higher the conductivity. Decrease in porosity by any means causes increase in the thermal condy. H. F. S.

The thermal conductivity and some other properties of two commercial heat insulating brick used in kiln construction. A. T. GREEN. *Trans. Ceram. Soc.*, **23**, 271-6(1924).—One batch of brick was made by mixing diatomaceous earth with 15% of cork and sawdust and firing to 890°C. The other was made by mixing diatomaceous earth with 15% sawdust and 10% clay and firing to 890°C. The second brick had much the greatest mech. strength. The thermal condy. was slightly higher. The condy. of these brick was about $\frac{1}{4}$ that of fire clay brick at temp. about 500°C. H. F. S.

Graphite in Nyasaland. ANON. *J. Soc. Chem. Ind.*, **44**, 219(1925).—Flake graphite which has been worked in Nyasaland is reported by the Brit. Imperial Inst. to be of excellent quality, equaling the best grades of the Ceylon mineral. H. H. S.

Interesting facts about refractories. FRED A. HARVEY. *Fuels and Furs.*, **2** [4, 5, 6, 7, 8], Apr. to Aug. (1924).—The first paper deals with silica brick; sources of raw mat., compn., mfr., props., density, softening point, strength, porosity, sp. ht., therm. condy. and expansion. Diff. between permanent expansion on firing and subsequent htg., which is reversible, is noted. The second article deals with fire clay brick in same manner with the addn. that, under properties, slag action, spalling and abrasion

are here given. The third article deals with silica, fire clay and spec. cements. Dangers of adding too much fire clay to grd. silica bat, which greatly lowers the fusion point, are pointed out. Methods of raising the fusion point by finer grinding and decreasing fire clay content, as well as subst. raw ganister for a part of the silica bats are mentioned. For fire clay brick a mixt. of 20 to 30% calcined clay grd. with 80 or 70% raw clay of same compn. as the brick makes best cement. Use of "black strap" molasses for obtaining a hard cement without lowering the fusion point, is also mentioned. Part IV is a discussion of the mfg. and props. of magnesite, silicon carbide, aluminous refrac., alundum, dolomite, diatomaceous earth and zirconia. Part V deals with the testing of refrac. A gen. discussion of the three classes of "failures" and suitable tests is followed by concise directions for sampling, inspection, how to judge silica brick and shapes, vol. change on re-htg., softening point, d., load test, crushing and mod. of rupture, spalling, slagging, abrasion, condy., fineness and plasticity. Altogether a very interesting and complete series of articles on this subject.

R. D. L.

Refractory industry in Canada. W. G. WORCESTER. *Contract Rec. and Eng. News*, **39**, 111(1925).—Saskatchewan clays particularly are being developed with remarkable success. It is only recently that the possibilities of the refrac. clays of Sask. have been known. The important refrac. clay deposits in Canada are those at Clayburn, B. C.; those at Dirt Hills, S. Sask., and the siliceous kaolinite deposits at St. Remi, P. Q. In Sask. there is evidence to warrant the assumption that the deposit is very large. Development work has progressed materially. The Canadian Pacific and the Canadian National Railways have installed the Sask. products on a number of their locomotives, first in conjunction with imported arch tile and later, through the findings of the first tests, they had no hesitancy in sending out locomotives equipped completely with Sask. tiles. Results have been most satisfactory; in some cases the local tiles have outlasted imported tiles by many thousand miles service. Hand molded and machine made wares have been made which have entered into direct competition with imported wares.

O. P. R. O.

Refractory materials for constructing hearths and coke-ovens. W. SOHERR. *Glückauf*, **60**, 1055-63(1924).—A review of the phys. chemistry of the behavior of refrac. including the system $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$, which in itself suffices to explain the behavior of most materials. Silica stone prepd. by adding milk of lime to quartzite shows, in the form of thin sections, the individual metamorphic forms of silicic acid, quartz, tridymite and cristobalite. By this means the quality of the stone can be judged.

(C. A.)

Silica brick and its manufacture. H. SCHILLING. *Chem.-Ztg.*, **49**, 6-7(1925).—The refractoriness of silica brick depends upon the network of tridymite crystals formed in the firing to cone 15. Microscopic methods furnish the only reliable means of testing since chem. analysis is useless. Too coarse a structure in the quartzite is undesirable because of difficulties of soln. in the flux (CaO) and crystallizing out as tridymite. The CaO plays a double rôle: (1) it acts as a flux, forming the matrix from which the pseudo-hexagonal tridymite crystals form and (2) the Ca silicate acts as a binder. The MgO content of the fired CaO should not exceed 5%, because the consequent increase in viscosity hinders the formation and crystn. of tridymite. The purer the CaO, the better.

(C. A.)

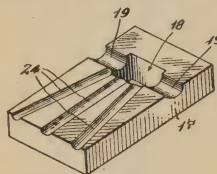
PATENTS

Kaolin refractory and process of making the same. ISAAC HARTER and ANTHONY M. KOHLER. U. S. 1,530,260, March 17, 1925. A refractory article consisting of particles of kaolin fired at a temp. of not less than 3000°F and bonded with kaolin.

Art of manufacturing zirconium compounds. LONNIE W. RYAN. U. S. 1,530,139, Mar. 17, 1925. The method of mfg. zirconium compds. which comprises decomposing

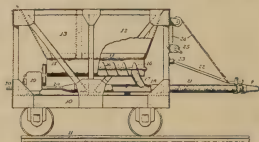
a siliceous zirconium ore with not more than twice its weight of sulphuric acid, neutralizing the free acid in the resulting soln., pptg. a granular basic zirconium sulphate from said soln. and sepg. the pptd. granular basic sulphate.

Fire brick for furnace walls. CHARLES D. HOWREN. U. S. 1,529,183, Mar. 10, 1925. A fur. wall and the like having vertical and horizontal air channels, said wall



being formed of fire brick having transverse openings intermediate the ends thereof forming the vertical air channels, and transverse surface grooves connecting the said openings and forming the horizontal air channels, said brick also having surface grooves extending in the direction of their lengths, the latter grooves outletting through one end of the brick and communicating at their opposite ends with said air channels.

Making open-hearth-furnace bottoms. HARRY M. SCHAAB. U. S. 1,529,219, Mar. 10, 1925. The method of making open hearth fur. bottoms which consists in directing a stream of gaseous fluid into the fur. and against the portion of the fur. which is to be repaired from a point outside the fur., and introducing crushed dolomite to the stream while maintaining a dolomite fusing heat in the fur., the dolomite being introduced to the fluid stream in such manner that all particles of the dolomite will be immediately subjected to the action of the fluid stream, substantially as described.



Refractory material. DYNAMIDON-WERK ENGELHORN & Co., GES. Brit. 221,799, Sept. 14, 1923. Burnt magnesite or MgO contg. little or no flux is finely ground, pressed and sintered at 1500–1600°. The MgO may be hydrated before sintering and the sintered material is crushed and may be used as a mortar or for making brick. Clay, starch or tar may be added to facilitate molding and fired or hydrated magnesite 5–10% may be added to the sintered material. Cf. C. A., 18, 1889. (C. A.)

Refractory compositions containing zirconia. G. KALLEN. Brit. 221,852, June 12, 1923. Refractory articles are made by firing a mixt. of crude Zr ore and a plurality of different binding ingredients which soften progressively with increase in temp. such as water glass, glass of low m. p., dolomite, feldspar, port. cement, magnesite, clay or bauxite; e. g., Zr ore 88, dolomite 9 and feldspar 3 parts are mixed with a 3% water glass soln., molded and fired at about 1000°. A fireproof paint is formed from Zr ore 40, water glass 20, dolomite 20, casein 5 and H₂O 20 parts. (C. A.)

White Ware

Investigations leading to the discovery of the cause of excessive sagger breakage. W. STEGER. *Trans. Ger. Ceram. Soc.*, 5, 3(1924).—Three main causes are (1) use of unsuitable raw mats. and unfavorable batch composition; (2) imperfect prepn. of the batch; (3) improper firing. This article only covers investigation under (1) and by detg. and charting the thermal expansion in 4 temp. zones between 20° and 750°C of clays varying in free silica content between 3% and 73% the critical periods of quartz and cristobalite inversion are clearly shown. The rapid expansion of the clays high in free SiO₂ naturally leads to lowered resist. to temp. changes and it is therefore important that in the initial firing all the free SiO₂ is taken into soln. The tests brought out that all clays contg. free SiO₂ have certain critical temp. ranges in which they are more susceptible to temp. changes on acct. of the changes of the quartz to other forms. The extent of the volume changes involved is dependent on the grain size and crystalline nature of SiO₂ bearing mat., the finer the grain the greater the change in vol. Mats. suggested to take the place of quartz are mat. with high alumina content, carborundum and natural sillimanite. F. A. W.

The influence of grain size on the solubility of quartz in feldspar in porcelain fire. KURT WETZEL. *Trans. Ger. Ceram. Soc.*, 5, 2(1924).—Quartz grains of uniform size are dissolved at a uniform rate by melting feldspar. In the series potash spar-quartz the soly. of the coarsest grained quartz used was 95% rising gradually to 100% for the finest grains. If a mixt. of grains is used the finest will be completely dissolved and the coarser ones only partially. Practically no difference in soly. was noted between Hohenbocka sand and Norwegian quartz. Different grades of feldspar showed more marked variation. Norwegian feldspar has a higher soly. than soda feldspar from N. Bavaria. Addition of strong flux such as lime or magnesia increases the soly. A comparison between the soly. of feldspar and a porcelain body showed close similarity.

F. A. W.

Changes in a porcelain body during firing. R. RIEKE. *Trans. Ger. Ceram. Soc.*, 5, 5(1925).—Trial pieces measuring $2 \times 1\frac{1}{4} \times \frac{3}{8}$ " were made from a hard porcelain body with a rational anal. approx. 55% clay subs., 25% quartz, 25% feldspar. These were fired in a commercial porcelain kiln to Seger cone 15 in 36 hours and drawn at intervals of 50°C. Both unfired and previously biscuited pieces were tested. Changes in shrinkage, porosity and sp. gr. are governed by the behavior of the clay subs. at temp. below the m. p. of the feldspar (1150–1200°C). Marked change in sp. gr. most noticeable around 940°C. Immediately after the feldspar has melted the formation of $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ crystals commences and reaches its max. around 1375°, continuing during the cooling. A filling of the fine pore spaces of the mat. with carbon, etc. during the early stages of firing could not be detd. Further tests with a biscuited hard porcelain body No. 2 having a very high clay subs. and low quartz content showed a marked drop in % pore space between 950° and 100°C and then a lag until 1070°C followed by another sharp drop, reaching complete vitrification about 100°C earlier than body No. 1. This indicates that a suitable quartz content promotes a more gradual shrinkage

TABLE I
HARD PORCELAIN BODY No. 1 (RAW)

| No. | Temp. in deg. C. | Linear shrink. in % | Absorption in % | Sp. gr. | Porosity in vol. % | Loss on ignition | Color |
|-----|---------------------|---------------------------|--------------------|------------|--------------------------|---------------------|--------------------|
| 1 | 460 | 0.52 | 22.1 | ..... | ..... | 6.85 | Dark gray |
| 2 | 520 | 0.52 | 22.5 | 2.631 | 37.2 | 6.90 | Dark gray |
| 3 | 610 | 0.52 | 22.8 | 2.564 | 37.0 | 1.48 | Light gray |
| 4 | 665 | 0.52 | 24.5 | 2.570 | 38.6 | 1.17 | Lighter than No. 3 |
| 5 | 715 | 0.52 | 24.6 | 2.572 | 38.7 | 0.88 | Lighter than No. 4 |
| 6 | 765 | 0.52 | 24.9 | 2.593 | 39.3 | 0.67 | Like No. 5 |
| 7 | 865 | 0.52 | 25.4 | 2.575 | 39.5 | 0.45 | White |
| 8 | 925 | 0.52 | 25.3 | 2.582 | 39.5 | 0.32 | Very light pink |
| 9 | 965 | 1.17 | 25.2 | 2.629 | 39.8 | .... | Very light pink |
| 10 | 1025 | 1.30 | 25.1 | 2.636 | 39.8 | .... | White |
| 11 | 1080 | 3.64 | 20.3 | 2.623 | 34.7 | .... | Slightly yellowish |
| 12 | 1120 | 7.59 | 13.5 | 2.599 | 25.9 | .... | Slightly yellowish |
| 13 | 1160 | 9.16 | 9.9 | 2.588 | 20.3 | .... | Yellow |
| 14 | 1205 | 11.74 | 3.5 | 2.547 | 8.2 | .... | Grayish yellow |
| 15 | 1250 | 12.56 | 0.2 | 2.499 | 0.4 | .... | Blue gray |
| 16 | 1305 | 13.15 | .... | 2.489 | .... | .... | Blue gray |
| 17 | 1350 | 13.08 | .... | 2.471 | .... | .... | Blue gray |
| 18 | 1410 | 12.82 | .... | 2.441 | .... | .... | Grayish white |
| 19 | 1410 | 12.04 | .... | 2.451 | .... | .... | White |
| 20 | Cooled in kiln | 12.30 | .... | 2.460 | .... | .... | Yellowish white |

TABLE II

HARD PORCELAIN BODY No. 1 (BISCUITED)

| No. | Temp. in deg. C | Linear shrink. in % | Absorption in % | Sp. gr. | Porosity in vol. % | Color |
|-----|--------------------|---------------------------|--------------------|---------|--------------------------|-----------------|
| 1 | 460 | 0.4 | 24.2 | 2.637 | 38.9 | Pink |
| 2 | 520 | 0.4 | 24.4 | 2.638 | 39.1 | |
| 3 | 610 | 0.3 | 24.4 | 2.639 | 39.2 | |
| 4 | 665 | 0.3 | 24.4 | 2.635 | 39.1 | |
| 5 | 715 | 0.3 | 24.6 | 2.631 | 39.3 | |
| 6 | 765 | 0.3 | 24.3 | 2.668 | 39.3 | |
| 7 | 865 | 0.3 | 24.1 | 2.634 | 38.8 | |
| 8 | 965 | 0.3 | 24.2 | 2.631 | 38.9 | |
| 9 | 925 | 0.3 | 23.8 | 2.639 | 38.6 | |
| 10 | 1025 | 0.6 | 23.7 | 2.641 | 38.5 | |
| 11 | 1080 | 2.78 | 19.6 | 2.620 | 34.0 | Same as Table I |
| 12 | 1120 | 6.32 | 13.5 | 2.605 | 26.0 | |
| 13 | 1160 | 7.18 | 10.9 | 2.588 | 22.0 | |
| 14 | 1205 | 9.55 | 4.8 | 2.531 | 10.9 | |
| 15 | 1250 | 10.84 | 0.2 | 2.495 | 0.4 | |
| 16 | 1305 | 11.20 | 0 | 4.484 | 0 | |
| 17 | 1350 | 9.68 | .... | 2.474 | .... |  |
| 18 | 1410 | 9.85 | .... | 2.551 | .... |  |
| 19 | 1410 | 9.16 | .... | 2.454 | .... |  |
| 20 | Cooled in kiln | 9.16 | .... | 2.461 | .... |  |

TABLE III

HARD PORCELAIN BODY No. 2 (BISCUITED)

| No. | Temp. in deg. C | Linear shrink. in % | Absorption in % | Sp. gr. | Porosity in vol. % | Color |
|-----|--------------------|---------------------------|--------------------|---------|--------------------------|-----------------|
| 1 | 540 | 0.3 | 24.8 | 2.557 | 38.8 | Pink |
| 2 | 640 | 0.0 | 24.5 | 2.566 | 38.6 | |
| 3 | 700 | 0.3 | 24.4 | 2.572 | 38.6 | |
| 4 | 755 | 0.3 | 24.8 | 2.564 | 38.9 | |
| 5 | 825 | 0.3 | 24.7 | 2.574 | 38.9 | |
| 6 | 905 | 0.4 | 24.1 | 2.555 | 38.1 | |
| 7 | 950 | 1.2 | 24.2 | 2.621 | 48.8 | |
| 8 | 980 | 1.6 | 18.9 | 2.637 | 33.3 | |
| 9 | 1020 | 1.9 | 18.0 | 2.633 | 32.2 | |
| 10 | 1070 | 3.6 | 18.6 | 2.622 | 32.8 | White |
| 11 | 1090 | 5.9 | 12.3 | 2.603 | 24.2 | |
| 12 | 1120 | 10.5 | 5.6 | 2.580 | 12.6 | Yellow |
| 13 | 1150 | 12.3 | 0.2 | 2.520 | 0.5 | Gray |
| 14 | 1180 | 12.0 | 0.2 | 2.523 | 0.5 | |
| 15 | 1210 | 12.4 | 0.0 | 2.518 | 0.0 | Bluish gray |
| 16 | 1250 | 13.0 | .... | 2.527 | .... |  |
| 17 | 1300 | 13.4 | .... | 2.515 | .... |  |
| 18 | 1350 | 13.5 | | 2.524 | | Grayish white |
| 19 | 1400 | 12.9 | | 2.509 | | White |
| 20 | Cooled in kiln | 11.6 | | 2.530 | | Yellowish white |

and vitrification and thereby lessens the danger of warpage. Tables I, II and III show comparative results.

F. A. W.

Improperly pugged clay and its effect on: (a) The wage earning capacity of the operatives; (b) the loss of defective ware to the employers. ARTHUR HOLLINS. *Trans. Ceram. Soc. (Eng.)*, **23**, 157-75(1924).—H. spoke as representative of the National Society of Pottery Workers. Vertical pug mills produce clay that is not so consistent or homogeneous as clay from horizontal pug mills. Pugging rolls, such as are used on the Continent, produce the best pugged clay but their output is limited to 250 pounds every 25 minutes. For rapid working and a good final product, the pugged clay should be uniform in consistency (hardness), plasticity, and homogeneity (closely allied to consistency but including elimination of air bubbles). The pugged clay given to various classes of workers should be of proper consistency for that particular work. Improperly pugged clay may be too hard or too soft, may contain both hard and soft clay, may contain air bubbles. These defects slow down working and reduce the operators wages. They also reduce the employers profits. Non-uniform sizes in finished ware, due to variation in water content of pugged clay, cause difficulties in fitting decorative patterns and reduce transferrers wages. Too soft clay reduces the life of molds by causing a pin-holed surface. Clay that is too wet produces pin-holed ware. Clay should be stored after pugging. Water should never be added at the pug mill. If clay has become too dry it should be re-blunged. The pugging of clay should be in the hands of more intelligent men than is commonly the case.

H. F. S.

The discovery of china in Europe. J. W. MELLOR. *Trans. Ceram. Soc. (Eng.)*, **23**, 179-81(1924).—In 1709 J. F. BÖTTGER, a German apothecary apprentice, working in the Disden Laboratory of Augustus the Strong, King of Poland, first made true hard porcelain in Europe. In France in 1765, MME. DARNET, the wife of a medical man of St. Yrieix near Limoges, noticed a white clay abundant in the community and sent it to a chemist to det. whether it could be used as a sort of natural soap. He identified it as a mixt. of kaolin and feldspar and this led to the French china indus. In England, WM. COOKWORTHY, a chemist, made an exhaustive search for china making mats. and finally in 1768 discovered suitable mat. at St. Stephens near St. Austell. He established 2 factories for making hard porcelains but this kind of manuf. was abandoned after a few years. However the mats. discovered by COOKWORTHY were used in other branches of ceramics.

H. F. S.

Electrical porcelain: the effect of varying the composition upon some of its properties. ERNEST WATKIN. *Trans. Ceram. Soc. (Eng.)*, **23**, 185-210(1924).—Substituting feldspar for flint reduces the maturing temp. of the body, producing a more glassy structure, which has a higher sp. gr., but which is weaker mechanically. The sp. elec. resist. is decreased, but the dielec. strength is increased. This evidence disproves any relationship between the sp. resist. and dielec. strength. Substituting clay for flint increases both the dielec. strength and sp. resist., but reduces the mech. strength. Substituting ball clay for china clay has a deleterious action on all properties investigated, elec. and mech. Substituting red clay for china clay reduces slightly both the dielec. strength and sp. resist., also the mech. strength. Substituting zirconium silicate for flint greatly increases the mech. strength, but has little influence on the elec. properties. Substituting steatite for feldspar increases greatly the sp. resist., but has little effect upon the dielec. strength or the mech. strength.

H. F. S.

Note on alkaline casting slip. F. S. WORTHINGTON. *Trans. Ceram. Soc.*, **23**, 277(1924).—The amt. of contraction to which cast ware is subject in drying and firing is affected by the weight of solid matter per pint of slip, the greater the weight per pint the less the contraction. Ware cast with light slip is more liable to craze than ware cast with heavy slip.

H. F. S.

Glaze defects on whiteware. A. SCHOBLIK. *Keram. Rund.*, 33, 7-9(1925).—If the acid content of a glaze is too low it will not unite thoroughly with the body. If the acid content is too high there will not be sufficient basis to form a good glass. In the first case the glaze will either run from the body or else become absorbed by the body because of its low viscosity. Glazes contg. too much SiO_2 will develop matt glazes due to the crystn. on the surface which can be seen under the microscope. If the content of silica is too high the mtg. point of the same may often be increased sufficiently to cause small pits to remain upon the surface due to gases which have escaped through the glaze in firing. Too much whiting will also cause a crystn. of the glaze as well as small bubbles on the surface. This trouble can often be overcome by adding a small amt. of flint to the glaze. If too much flint is added needle-like crystals are formed on the surface of the glazes which contain both Ca and SiO_2 . The crystals formed on the surface of glazes contg. too much BaO are entirely different from those formed with too much SiO_2 or CaO. A very good matt may be produced in this manner. Glazes contg. too much BaO are very susceptible to sulphuring. Strong oxidizing firing facilitates the combination of the S gases with the Ba in the glaze and a slightly reducing atmos. should be maintained to minimize this action. Underfired glazes often have a matt appearance not due to crystn. When these glazes are examined under the microscope they appear to be covered with many small air bubbles which give them the matt appearance.

H. G. S.

Glazes in the ceramic industry. P. P. BUDNIKOFF. *Izvestia Ivanovo-Vosnessenskovo Politech. Inst.* (Russia), I, 87-97(1919).—The properties, compns. and methods of prepn. of various glazes for various substances are given, also methods of applying the glazes.

J. S. J. (C. A.)

Equipment and Apparatus

Portable equipment for transverse tests of brick. H. D. FOSTER. *The Clay Worker*, 83 [3], 234-6(1925).—The app. as developed at the U. S. Bur. of Stand. is described. A detailed drawing from which it can be built is given. P. D. H.

Temperature-load determinations and their possibilities. HANS HIRSCH. *Trans. Ger. Ceram. Soc.*, 5, 3(1924).—Describes tests made with a Steger lever press and a new app. developed in the "Laboratory for Clay Industries," Berlin. These both have a sensitive recording device. Small test pieces having a cross-section of 8 cm.^2 were used and heated in an elec. fur. with a temp. advance of $4-5^\circ\text{C}$ per min. Pressures used were 1 kg. per cm.^2 for silica brick and 2 kg. per cm.^2 for clay brick. Numerous charts show the behavior of widely different refrac. bodies and kaolins. Those with increasing Al_2O_3 content showed a more gradual softening range. Refractories high in silica showed a preliminary expansion and then a rapid softening. Kaolin showed an irregular curve indicating a retardation in the softening at certain stages. F. A. W.

The quartz spectrograph in mineral analysis. E. W. TODD. *Univ. Toronto Studies, Geol. Ser.*, No. 17, 66-8(1924).—The use of a spectroscope in qual. detn. of the elements present in a mineral, and in forming a rough est. of their abundance, is illustrated by several examples.

(C. A.)

PATENTS

Device for measuring the specific gravity of material consisting of gravel. ULRICH TILLINGER (Charlottenburg). Ger. Pat. 399,080. *Chem. Zentralblatt*, 2 [14], 1845 (1924). The mat. is put in an air tight container in which the vol. of air surrounding the mat. can be changed. By changing the air vol. in the container the difference of the air press. indicates the sp. gr. of the mat.

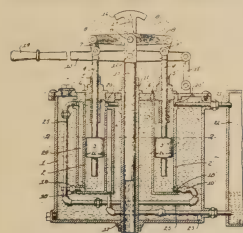
W. S.

Ceramic press and the like. HILMAR MUELLER. U. S. 1,530,053, Mar. 17, 1925. In a mach. of the character set forth, in combination with the plunger, die case and face

plate, friction means yieldingly sustaining the die case at any elevation to which it is moved, and power driven mechanism for raising and lowering the die case and so acting as not to interfere with the depression of the die case by the face plate during the pressing operation.

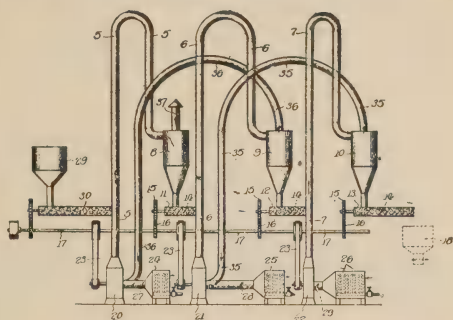
Viscosity comparator. LESLIE R. PRIEST. U. S. 1,529,811, Mar. 17, 1925. A viscosity comparator comprising a pair of receptacles respectively adapted to receive and contain a supply of standard liquid and a supply of the liquid to be compared therewith, each receptacle having associated therewith an orifice through which the liquid contained therein may flow, the areas of said orifices bearing a known relation to each other;

means for producing press. in the liquids contd. within said receptacles to cause said liquids to flow through said orifices; a connection between the press. producing means of the two receptacles to cause the press. of the 2 liquids to bear a known relation to each other; and means for indicating the viscosity differential between said liquids as detd. by their comparative rates of flow through said orifices.

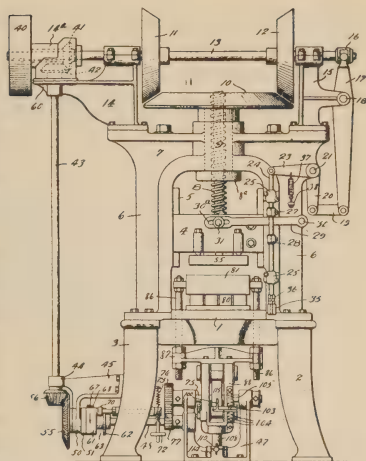
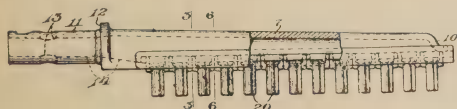


Method and means for treating material. PHILIP A. SINGER. U. S. 1,528,995, Mar. 10, 1925. In a treating system of the character described the combination of a series of treating pipes and cyclone collectors in alternate arrangement, the pipes being substantially vertically

disposed throughout a materially large part of their respective lengths, one of said collectors being at the rear end of the system, each intermediate collector having means associated therewith for feeding finely divided mat. into the treating pipe next following in the direction of travel of the mat. through the system, means for introducing such mat. into the first pipe of the series, means for causing an aeriform treating current to flow in each of said pipes, and with a greater velocity in the first thereof, to carry such material to the collectors respectively, and means for conveying exhaust current from one of said collectors and discharging it into the system at a place ahead of one of said collectors.

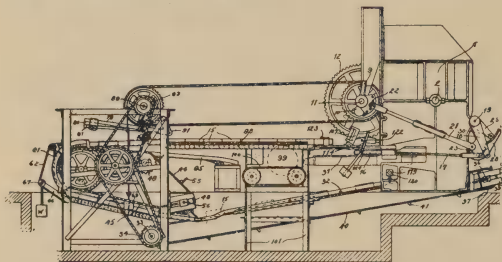


Rabble and rabble arm for metallurgical furnaces. LOUIS R. KELLEY. U. S. 1,529,256, Mar. 10, 1925. The combination of an arm having a channel opening laterally through one side of the arm, the side walls of the channel being oppositely directed to form supporting flanges, a plurality of members removably supported by said arm upon said flanges and substantially closing the other-wise open side of the channel, and



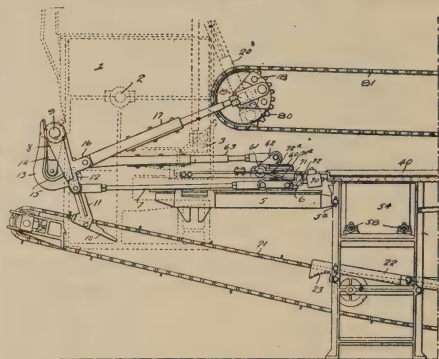
passageways formed in each of said members to permit air to pass therethrough from within said channel.

Mechanism for handling brick molds. DAVID J. STRICKLAND. U. S. 1,529,452, Mar. 10, 1925. In a brick mach., the combination with a pug mill adapted to fill a series of molds fed thereunder, of a pair of arms adapted to receive said filled molds and deliver them to a conveyor, a second conveyor for receiving said filled molds and upsetting them and means engageable with said molds before and after upsetting whereby the brick are loosened therein.



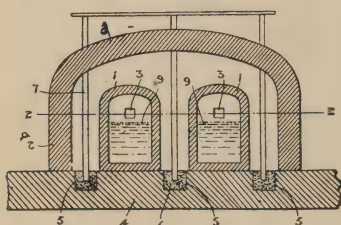
Mar. 10, 1925. In a brick making mach., the combination with a reciprocating carriage, of a rock shaft carried by said carriage, mold receiving arms connected to said rock shaft, means for normally holding said arms elevated together with means for depressing said arms. In a brick making mach., a mold having an inclined rabbeted shoulder at each end thereof.

Glass furnace. ALLAN GRAUEL. U. S. 1,529,480, Mar. 10, 1925. In a glass fur. the combination with the closed fur. wall and foundation bed having channels

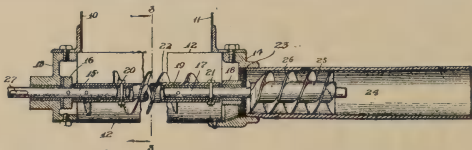


formed therein, of glass pots placed between the channels, and an incandescent body contd. in said channels and radiating its ht. upward around the glass pots.

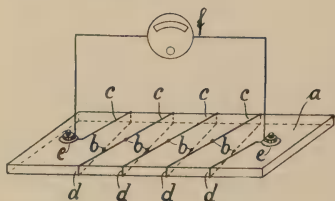
Method and apparatus for transferring dust. JOSEPH B. TAYLOR. U. S. 1,528,348, Mar. 3, 1925. Means for compressing dust to expel the air therefrom in a uniform and continuous man-



ner, comprising screw conveyor and a slightly flaring tube surrounding the same and extending beyond the end of the screw.



Device for the measurement of heat. ERNST SCHMIDT. U. S. 1,528,383, Mar. 3, 1925. In a device for measg. the ht. flow from bodies, a member having flat surfaces, one surface of which is applied to the body, the ht. flow from which is to be measured, thermal-elec. means associated with the opposite surfaces of said member and adapted to respond to temp. differences between the surfaces



of said member, and means connected in series with said thermo-elec. means and calibrated to indicate the degree of said response.

Kilns, Furnaces, Fuels and Combustion

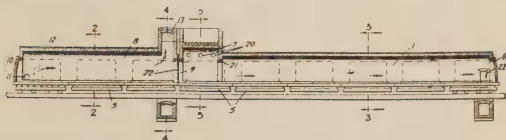
Oil burning and oil-burning equipment. W. F. SCHAPHORST. *Jour. Ind. & Eng. Chem.*, **17** [1], 5-10(1925).—A resumé of the uses of oil in chem. and ind. plants as fuel and its advantages. There are two broad classifications of burners (1) steam jet or air jet and (2) mechanical atomizing. Advantages and disadvantages of each are given. Shape and combination of openings in various burners appear to make little, if any, difference in burner efficiency. Data are included on htg. of oil, fur. vols. required, current prices of oil and a few typical burners are shown. R. D. L.

The analysis of fuel gas. S. W. PARR AND F. E. VANDEVEER. Univ. of Ill. Eng. Exp. Sta., *Circ.* **22**, No. 12, 8.—A 41 pg. bull. giving in convenient and concise form, practically all information necessary for analysis of the fuel gases, *i. e.*, by-product coke oven, retort, water and carbureted water and natural gases. A description of the Ill. Gas App., an adaptation of the Morehead type, which is a simple and accurate app. for gas anal., will be of interest to ceramic mfrs. R. D. L.

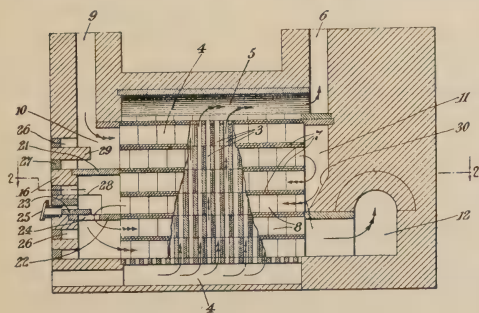
Oil burner has no atomizer. ANON. *Ceram. Indus.*, **4** [2], 156(1925).—A new mech. oil burning system is described. A feature of the burner is that it requires no atomizing agent such as steam or compressed air. P. D. H.

PATENTS

Tunnel furnace. CHARLES M. STEIN. U. S. 1,529,755, Mar. 17, 1925. The method of operating a tunnel furnace which comprises conducting a gaseous current, which is to enter into combustion, past the heated material to preheat the gaseous current, forming a combustible mixt. including said gaseous current, igniting the mixt., and passing the products of combustion along the material to be heated at a relatively higher velocity than that at which the gaseous current moves past the heated mat.



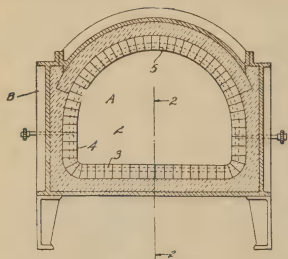
Recuperator structure. CHARLES M. STEIN. U. S. 1,529,756, Mar. 17, 1925. A recuperator structure comprising tiles having substantially vertical air passages therein,



in, the tiles being built into parallel spaced columns, substantially horizontal plates extending between adjacent columns to provide waste gas conduits extending across the recuperator from side to side, chambers disposed respectively at said above-mentioned sides of the recuperator and in communication with said conduits, bracing members extending between the outer walls of said chambers and the outer sides of the end tiles of the several respective columns, and substantially horizontal baffle plates extending across one of said chambers and supported by said bracing members to divide said chamber into upper and lower sections, individual draft regulators being provided between adjacent pairs of bracing members in one of said chambers.

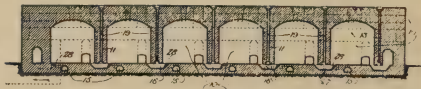
in, the tiles being built into parallel spaced columns, substantially horizontal plates extending between adjacent columns to provide waste gas conduits extending across the recuperator from side to side, chambers disposed respectively at said above-mentioned sides of the recuperator and in communication with said conduits, bracing members extending between the outer walls of said chambers and the outer sides of the end tiles of the several respective columns, and substantially horizontal baffle plates extending across one of said chambers and supported by said bracing members to divide said chamber into upper and lower sections, individual draft regulators being provided between adjacent pairs of bracing members in one of said chambers.

Electric furnace. HARRY A. MULVANY and HARRY E. KENNEDY. U. S. 1,529, 368, Mar. 10, 1925. In a fur. of the character described, a brick lining, each brick of



said lining consisting of a base portion, a head at each end thereof, a central web extending between the head members and forming a part of one of the head members, said web being separated and notched with relation to the opposite head member, said brick when placed in the furnace being alternately reversed, said webs when the brick are reversed forming zigzag channels between the brick, and a heating element of zigzag formation adapted to be placed in the channels and supported at opposite ends by the notched portion of each brick.

Oven for firing refractories and the like. HEINRICH KOPPERS. U. S. 1,528,555, Mar. 3, 1925. A ring fur. for firing ceram. ware and the like comprising a plurality of chambers, partitions sepg. said chambers, ports at the lower ends of said partitions communicably connecting the lower portions of adjacent chambers with each other, ducts communicating with each of said ports through which means may pass to shut off communication through said ports, other ports at the lower ends of said partitions, said ports communicably connecting with an upwardly extending channel, said last mentioned ports and channels communicably connecting the lower portion of one chamber with the upper portion of the next adjacent chamber, ducts leading to each of said last mentioned channels and ports through which means may pass to shut off communication through said ports.



Geology

Origin of red soils. E. BLANCK AND F. ALTEN. *Landw. Vers. Stat.*, **103**, 73-90 (1924); *Jour. Soc. Chem. Ind.*, **44B**, 20(1925).—The effect of humic colloids on the penetration of iron compds. into clays and soils is examined. By allowing solns. of iron salts to drop very slowly from capillary tubes on to powd. marble and dolomite it was found that in the absence of humus the iron is pptd. immediately on the surface of the particles, whereas in presence of humus it penetrated much further. Differences in color were observed. The bearing of these expts. on the origin of red clays is considered.

H. H. S.

Fluorspar in S. Africa. ANON. *J. Soc. Chem. Ind.*, **44**, 239(1925).—Fluorspar averaging 99.5% CaF_2 with a max. of 0.3% SiO_2 is found in the dolomite formation near Ottoshoop, Zeerust. Owing to the extraordinary purity of the ore, no prepn. is necessary, and a considerable export trade has lately commenced.

H. H. S.

Belgian Congo minerals. ANON. *J. Soc. Chem. Ind.*, **44**, 239-40(1925).—Tin oxide (cassiterite) extracted in 1923 was 720 T.; uranium exports were 478 T.; and cobalt minerals are found.

H. H. S.

Barytes (Canada). H. S. SPENCE. *Can. Inst. Min. and Met., Bull.* **155** (1925).—Canada possesses important barytes resources, which are little used to meet her requirements. Domestic demand is sufficient to enable a small mill to operate profitably, provided proper attention is paid to methods of preparation. The growing consumption of lithopone in Canada which is made from barytes and zinc, suggests that the manuf. of this mat. to meet domestic demand is quite possible. No lithopone is made in Canada at present.

O. P. R. O.

Clay (Saskatchewan). ANON. *Sask. Bureau of Ind. (Regina), 4th Annual Report* (1924).—Among the known and tested deposits of Sask. clay may be listed those suitable

for use, wholly or in part, in the manufacture of: pottery or light ware, heavy ware, and refrac. These clays have been classified; records of tests are given from various districts; firing properties; fired color; chem. anal.; and a general brief resumé of clays of the Province in general are given. O. P. R. O.

Silica (Canada). L. H. COLE. Can. Inst. of Min. and Met., *Bull.* **155** (1925).—Silica; its production; producing and prospective producing localities; method of prepn. for market; disposition of products; and present market conditions are discussed. O. P. R. O.

Feldspar (Canada). H. S. SPENCE. Can. Inst. of Min. and Met., *Bull.* **551** (1925).—Feldspar; its deposits; producing and prospective producing areas; methods of preparation for market; disposition of products; and present market conditions are surveyed. O. P. R. O.

Graphite (Canada). H. S. SPENCE. Can. Inst. Min. and Met., *Bull.* **155** (1925).—Canada possesses important flake graphite resources, the ore-bodies being among the richest of those known and exploited on this continent. Cost of mining and recovery of the flake from hard gneissic ores puts operators at a serious disadvantage, and permits of cheaply-won Madagascar flake underselling the Canadian products in the U. S. market. There are no domestic crucible works to absorb production, and the Brit. and European markets are taking increasing amts. of Madagascar flake. O. P. R. O.

Alunite (New South Wales). L. F. HARPER. Geol. Surv., *Bull.* **8** (1924).—This bull. gives a brief record of alunite in New South Wales. Only one workable deposit has yet been found, and geol. investigations have been restricted as regards this occurrence. O. P. R. O.

Bauxite. L. F. HARPER. (New South Wales.) Geol. Surv., *Bull.* **8** (1924).—Aluminium (alunite and bauxite): Much more field and lab. work is necessary before detailed acct. can be given in regard to bauxite. Some of the analyses of trial samples indicate that true bauxite occurs in N. S. W., and attention is drawn in this bull. to possible value of the deposits from which these analyses were obtained. O. P. R. O.

Refractory clays of central Russia. M. M. PRIGOROVSKII. *Matter on natural resources of Russia*, No. **35**, 59 pp.(1922); *Rev. Géol.*, **5**, 98-9.—There are 5 types of deposits: (1) sandy clays with 50-60% pure clay, used for making saggars; (2) nearly pure clay with 85-92%, contg. fossil wood used for earthenware; (3) carbonaceous clay, 70-80%, with flakes of mica, particles of carbonaceous matter, and pyrite, used sometimes for saggars; (4) micaceous clay; (5) foliated clay. The purer clay is sedimentary; the others were formed by the alteration of limestones. (C. A.)

Bauxite associated with siderite. E. F. BURCHARD. *Bull. Geol. Soc. Am.*, **35**, 437-48(1924).—A new bauxite field has been found in N. E. Mississippi. Associated with the bauxite are lenticular masses of siderite, 6 to 20 in. thick, which alter easily to limonite. Most of this bauxite contains so much Fe_2O_3 and SiO_2 that it is considered low to medium grade: Al_2O_3 (bulk) 35-45%; Fe_2O_3 5-35%; SiO_2 10-30%. Geologic relations seem to indicate a deposition in fresh water peat swamps. (C. A.)

Chemistry and Physics

The effect of prolonged grinding on the density of quartz. A. J. DALE. *Trans. Ceram. Soc. (Eng.)*, **23**, 211-6(1924).—The density of a given sample of quartz is dependent on the grain size of the sample taken, diminution of grain size, down to a certain limit, causing a slight increase in the d. of the mat. Prolonged grinding of vein quartz in an agate mortar causes a reduction in d. H. F. S.

Mechanical composition curves of soils, clays, and other granular substances. G. W. ROBINSON. *Jour. Agri. Sci.*, **14**, 626-33(1924); *Jour. Soc. Chem. Ind.*, **44B**, 19(1925).—A study of the mech. compn. curves of typical soils, clays, etc. With mats.

of uniform origin, such curves are smooth and, for ordinary soils, of a sigmoid type. The steepest portion of the curve gives the modal fraction, *i. e.*, the fraction present in greatest frequency. In very heavy clays the modal fraction is at the lower limit of the range, while for mechanically disintegrated mats. it is at the upper limit of the range of particle size. The use of the logarithm of settling velocity in water is recommended as a measure of particle size. For ordinary clays and soils the lower limit appears to be given by $\log v = 7.0000$. The limit for "clay" in mech. anal. should, it is suggested, be $\log v = 5.0000$. H. H. S.

Base exchange in relation to adsorption. E. A. FISHER. (Faraday Soc. Meeting, Dec. 2, 1924.) *Jour. Soc. Chem. Ind.*, **44**, 114(1925).—Many of the so-called adsorptive processes that go on in soils can be explained equally well on the basis of classical chemistry. The dyeing of wool shows many points of resemblance to absorption by soil, and the two sets of phenomena are too similar for them to be entirely unrelated. True adsorption probably plays an insignificant rôle in the soil; and with many other colloidal mats. also "adsorptions in colloidal systems" is synonymous with "the chem. reactions of colloidal subs." H. H. S.

Volumetric determination of Pb_3O_4 in red lead. E. F. FIGG. *Jour. Soc. Chem. Ind.*, **44**, 68T(1925).—M. LIEBIG's method of treating red lead with acetic acid and a known amt. of sodium thiosulphate, and titrating back with iodine, suffers from the fact that a copious ppt. of PbI_2 masks the end-point. L. uses a large excess of sodium acetate to prevent the pptn. This method gave 88.0% Pb_3O_4 as against 86.8% by the method of DIEHL and TOPF, and the higher figure is regarded as more accurate. H. H. S.

Adsorption. A. V. SLATER. *Jour. Soc. Chem. Ind.*, **44**, 161-4(1925).—Absorption is the process in which mols. of two subs. completely intermingle to form homogeneous mixtures or solns.; adsorption is the concentration of one subs. at the surface separating it from another, causing a layer of increased concn. only a few mols. thick at most. Adsorption follows Freundlich's formula $V = KC^{1/n}$ where V is the amt. adsorbed, C the concn. in the liquid and K and n constants depending on the nature of the soln. and the adsorbent. Defining a polar subs. as one affected by an electric field, and a non-polar subs. as one not thus affected, the rule is that polar adsorbents adsorb polar subs. and non-polar adsorbents adsorb non-polar subs. from soln. better than adsorbents from the other class in each case. Thus silica gel adsorbs polar subs. like water most easily, while active carbon has a greater attraction for non-polar subs. such as benzene. The effect of chem. attraction on adsorption is given by Langmuir's formula:

$$M = \frac{No}{N} \cdot \frac{y^\mu}{1 + y^\mu}$$

where M = mols. adsorbed; No = number of available valencies per unit area; N = Avagadro constant 6.1×10^{23} ; y = rate of evaporation from completely covered surface; μ = number of atoms or mols. striking the surface. H. H. S.

X-ray laws in the field of optics. R. A. MILLIKAN AND I. S. BOWEN. *Proc. Nat. Acad. Sci.*, **11**, 119-22(1925).—It is proved exptly. that Moseley's law, with its corollary, the irregular-doublet law, holds in the field of optics as in the field of X-rays. H. H. S.

Conversion of flint into amorphous quartz. RICHARD GRÜN. *Stahl u. Eisen*, **44** [30], 883-7(1924).—Testings of the author about the conversion of the cryptocrystalline flint into amorphous quartz showed that in heating the flint over 1200°C a noticeable conversion takes place. The d. decreases with increasing temp. At 1500°C the d. of tridymite is reached. As the conversion takes place very fast, and the

flint becomes constant in vol. after being fired once, it possible to use flint in manufacturing refrac.

W. S.

Influence of alumina and magnesia on the chemical properties of silicate slags.

BO KALLING. *Jernkontorets Annaler*, **108**, 283-307(1924).—The examns. were based upon the principle of detg. the state of equil. in the liquid phase between the slag to be examd. and a metal bath of known compn. As metal baths, 18 alloys with increasing Si content, from 0.64 to 10.15% of Si, were used. The other constituents were 80-73% Mn, 6.35-3.3% C and 12.8-13.2% Fe. The slag was fused in an elec. resistance furnace in a crucible of Acheson graphite. When the charge was melted and the temp. had reached 1600° the metal was added in a pulverulent state, 15 g. in each expt. This small quantity was used in order that a variation in the compn. of the metal bath should have the least possible influence upon the compn. of the slag. After addn. of the metal the crucible with contents was kept at const. temp. for 1 hr. or more and then cooled, and the Si content of the metal was detd. If it had decreased an alloy with less Si was used in the next expt. This procedure was repeated until an increase in the Si content of the metal could be observed and so the point of equil. could be fixed rather exactly. The various slags were prepd. with the least possible content of FeO in order to obtain a sort of equil. between FeO in the slag and Fe in the metal. It appeared that the Fe content in the metal increased a little during the expts., but not more than 0.2-0.6%. Special care was taken that the furnace gases should not react with the slag. The first slag examd. contained SiO₂ 46, MnO 10, FeO 0.25, Al₂O₃ 1.0, MgO 0.6 and CaO 42.2%. Equil. was found with a metal contg. 8% Si. When the Al₂O₃ content was increased this compd. acted as an alkali, moving the point of equil. to a metal with less Si. In this slag 1 Al₂O₃ corresponds to 0.14 CaO, or 1 Al₂O₃ = 0.23 CaO when calcd. by wt. The effect of MgO was like that of CaO when calcd. by wt., or in equiv. 1 MgO = 0.72 CaO. Similar expts. were then carried out with a more basic slag contg. SiO₂ 37, MnO 6.5, FeO 0.4, Al₂O₃ 6.7, MgO 0.7 and CaO 48.8%. Equil. was found with a metal contg. 1.50% Si. In this slag Al₂O₃ acted as an acid and to just the same extent as its basic action in the more acid slag, 1 g. of Al₂O₃ neutralizing 0.23 g. of CaO, or 1 Al₂O₃ = 0.14 CaO by equivalents. MgO was nearly equiv. to CaO by wt., or in equivalents 1 MgO = 0.69 CaO. In regard to their influence upon S and P in metal baths, MgO and CaO can be considered equiv. when calcd. by wt.; Al₂O₃ has only very little influence.

(C. A.)

Density of the oxides of zirconium and hafnium. G. HEVESY AND V. BERGLUND.

J. Chem. Soc., **125**, 2372-5(1924).—The oxides were prepd. from the sulphates by driving off excess of H₂SO₄ at 400° and igniting finally at 1000°. The ds. at 20° are for ZrO₂ 5.73, and for HfO₂ 9.67. The oxides prepd. from basic sulphates or from oxychlorides give values lower by as much as 0.2. The Hf content of Zr samples may be found with a fair degree of accuracy from the d. of the oxide prepd. from the normal sulphate.

(C. A.)

The separation of small quantities of calcium from large quantities of magnesium.

V. RODT AND E. KINDSCHER. *Chem.-Ztg.*, **48**, 953-4, 964-5(1924).—The results of a series of expts. show that it is practically impossible to accomplish a successful sepn. of Ca from Mg by the conventional oxalate method when the Ca content amts. to only a few mg. in the presence of Mg equiv. to 1 g. MgO. On the other hand, more satisfactory results can be obtained by depending upon the soly. of MgSO₄ in dil. alc. in which CaSO₄ is practically insol. To the soln. contg. a little Ca and considerable Mg as chlorides, add sufficient N H₂SO₄ to effect the decompn. of the Ca to CaSO₄ and evap. to dryness in a porcelain dish. Take up the residue in 3 cc. of water and heat on the water bath until the soln. becomes very thick on cooling. Then, while stirring well, add a mixt. of 10 vols. EtOH and 90 vols. MeOH until the vol. of liquid amts. to 50 cc. After

a short time filter and wash the residue well with a mixt. of 5 vols. EtOH and 90 vols. MeOH. Ignite the residue of nearly pure CaSO_4 and dissolve the ash in dil. HCl. Add $(\text{NH}_4)_2\text{C}_2\text{O}_4$ to ppt. CaC_2O_4 in the usual way and det. the oxalate content of the ppt. by KMnO_4 titration. The results should be accurate within a few tenths of a mg. (C. A.)

The separation of cadmium and zinc by means of hydrogen sulfide. G. LUFF. *Z. anal. Chem.*, **65**, 97-109(1924).—Although the soly. products of CdS and ZnS lie closely together, it is possible to effect a quant. sepn. of 0.2 g. of Cd, or less, from as much as 0.2 g. of Zn, provided care is taken to maintain conditions favorable to the deposition of cryst. CdS. Six methods out of 12 tested gave excellent results. Thus a quant. pptn. of CdS was obtained in the cold in a soln. contg. 9 cc. of concd. H_2SO_4 and 20 g. of $(\text{NH}_4)_2\text{SO}_4$, by introducing H_2S for 15 mins. and then gradually diluting to 135 cc. If the pptn. is started at near the b. p., the H_2S should be passed for 15 min., then small portions of water added at 5-min. intervals until in about 30 min. the vol. of soln. is increased to 135 cc. and finally the soln. is allowed to cool while H_2S is still passed. A similar procedure with not more than 11 cc. of concd. HCl also gave good results. (C. A.)

Electrolytic separation of copper, antimony, lead and tin. A. LASSIEUR. *Compt. rend.*, **179**, 827-9(1924).—A method of analysis has been worked out, and will be published elsewhere in detail, which permits the successive electrolytic detn. of Cu, Sb, Pb and Sn. The Pb-Sn sepn. takes place in 225 cc. of soln. contg. 20 cc. of concd. HCl, 5 cc. of concd. HF and 1 g. of $\text{NH}_2\text{OH} \cdot \text{HCl}$ with a carefully regulated cathode potential. The electrolysis of the Pb is started at 60° and this temp. is maintained for 10 mins. after which the electrolyte is cooled to 20° . The Pb is deposited quant. as metal and no Sn is deposited if less than 0.375 g. of Sn is present. It is necessary to have the Sn in the highest state of oxidation, so that after the detn. of Sb, the soln. should be oxidized with H_2O_2 . After the removal of the Pb, the soln. can be treated with 10 g. H_3BO_3 and 10 g. of $(\text{NH}_4)_2\text{C}_2\text{O}_4$, dild. to 300 cc. and electrolyzed for Sn with a Cu-covered cathode. (C. A.)

The detection of lead in kitchen pottery. C. DEBRUN. *Ann. fals.*, **17**, 467(1924).—The following procedure is recommended as being more sensitive for detecting small traces: Pour 100 cc. of 6% AcOH in the container to be examd., cover with a glass plate, let stand 24 hrs., wash the soln. into a porcelain evapg. dish, add 5-6 drops of 36° Bé. HNO_3 , evap. to dryness on the water bath, take up in 5 cc. of boiling water, evap. to dryness, dissolve in 15 cc. boiling water, filter through a plain filter and wash to a total vol. of 50 cc. To 10 cc. of the filtrate add 5 drops of 10% KI (sensitive to 1 part in 30,000) or of 10% K_2CrO_4 (sensitive to 1 part in 100,000). When the amt. of Pb is near the limit of sensitiveness of the test, the PbCrO_4 begins to show up only about 15 min. after adding the precipitant and pptn. is complete only after 2 hrs. (C. A.)

PATENTS

Process of making arsenate of lead. HENRY HOWARD. U. S. 1,529,998, Mar. 17, 1925. Process of making arsenate of lead which comprises heating to reacting temp. a mixt. containing arsenious oxid, a higher oxid of lead, a catalyst, and water in quantity at least sufficient to form a stiff paste.

Method of separating impurities from solutions of tin salts. SIMON JOSEPH LUBOWSKY. U. S. 1,529,260, Mar. 10, 1925. The method of sepg. solid mat. in suspension from solns. of tin salts which comprises forming a hydrated oxide of tin in the soln. of tin salts to carry down the suspended matter, and then withdrawing the supernatant liquid.

Method of producing crystalline oxide of tin. SIMON J. LUBOWSKY. U. S. 1,529,261,

Mar. 10, 1925. The method of producing a colored crystalline oxide of tin from pptd. tin hydroxides, which comprises heating the initial product at a temp. above 1900°F, for a period of time sufficient to produce the desired color value, and suspending the heat treatment, when the desired color value is shown.

Process for manufacturing aluminum compounds. EDSON R. WOLCOTT. U. S. 1,528,039, Mar. 3, 1925. The process which consists in subjecting a mixt. of aluminum silicate mat. and carbonaceous mat. to heat to effect destructive distillation of the carbonaceous mat., collecting the products so distilled, subjecting the residual mixt. of aluminum silicate mat. and residual carbon to further heating action in the presence of a halidizing agent to produce and volatilize a halide compd. of aluminum, separating such compd. from the gases and vapors passing off therewith in the volatilization operation, and treating the residual gases with material capable of absorbing the halogen in such gases and vapors to form a halide and returning the halide so formed to the hgt. and volatilization stage of the cycle of operations.

Zirconium compounds and pigments. D. TYRER. Brit. 217,323, March 14, 1923. White pigments contg. ZrO_2 and alk. earth sulfate are obtained by pptg. together ZrO_2 or basic Zr sulfate and an alk. earth sulfate and calcining the pptd. mixt. Several detailed procedures are described for obtaining Zr compds. from ores and making pigments of this character. E. g., Zr ore may be treated with H_2SO_4 to effect partial extn., the solidified mass dissolved in H_2O and the residue of the ore, alone or mixed with fresh ore, heated with $BaCO_3$ or a mixt. of $BaSO_4$ and C and flux and the product contg. zirconate dissolved in HCl. The solns. of chloride and sulfate may then be mixed in such proportions that the whole of the sulfate radical is pptd. by the alk. earth chloride present. $BaCO_3$ is then added to ppt. the remainder of the Zr and the entire ppt. is then sepd., dried and calcined, preferably at 1000°. (C. A.)

Alumina and aluminium chloride. HÖGANÄS-BILLESOLMS AKTIEBOLAG. Brit. 217,568, June 15, 1923. In the manuf. of Al_2O_3 by treating clay, argillaceous slate or bauxite with HCl, pptg. $AlCl_3$ by HCl gas and calcining the chloride, the mixt. of HCl and steam liberated in calcining the crystals is used for pptn. of chloride from the soln. and part or all the mother liquor after sepn. of the crystals is used for dissolving more raw material. (C. A.)

General

Terra sigillata not Samian ware. J. W. MELLOR. *Trans. Ceram. Soc. (Eng.)*, 23, 176-7(1924).—Terra sigillata was edible clay mined on the islands of Samos and Lemnos. It was used for many centuries, from at least 300 B. C. until the close of the Middle Ages, as a medicine. The red Samian pottery of the Romans had no connection with or relation to terra sigillata. H. F. S.

Note on the use of woodwool as a packing material. B. OLSEN. *Trans. Ceram. Soc. (Eng.)*, 23, 182-4(1924).—Restrictions affecting the use of straw for packing for fear of its acting as a carrier of the foot and mouth disease has led to the considerable use of woodwool for packing in Europe. Woodwool costs more than straw, but it cuts down breakage in transit, and is clean and dustless in use. When freshly made it is soft and pliant. H. F. S.

Sedimentation as a means of purifying clay. S. R. HIND. *Trans. Ceram. Soc. (Eng.)*, 23, 234-52(1924).—Sedimentation (as a consequence of deflocculation) notably reduces the percentage of iron in the clay, but does not eliminate it entirely. The osmosis machine effects no further sepn. of iron. Sedimentation either does not affect the propn. of other impurities (titanium alkalis and alkaline earths) or slightly concentrates them with the clay. The osmosis machine does not affect these impurities. Sedimentation gives a finer grained product and increases the contraction on drying.

and firing and increases the refractoriness of the clay. The osmosis mach. produces practically no further effect on these properties. Treatment with silicate of soda, by the deposition of gelatinous silicic acid on the clay, causes it to be workable with a higher propn. of water, and the dried clay shows a higher porosity. H. F. S.

Coal as an industrial fuel. D. J. DEMOREST. *Chem. Met. Eng.*, **32**, 274-6 (1925).—The factors detg. the choice of coal for various heating operns. are discussed. For steam raising, with a given price for coal, the coal to buy is the one with the greatest number of B. t. u. per lb., the highest ash fusion point, and which gives the least amount of trouble from coking or smoking. The best producer coal is a high volatile, low sulphur, low ash, high ash fusion temp., high B. t. u., coal which does not coke badly. It should be sized. The requirements for coking coals are good coking properties, low ash and low sulphur. Discussing powdered coal, the author cites two plants whose costs of powdering are respectively \$0.60 and \$0.70 per ton, on a production of 500 and 1000 tons. The greatest difficulty in the use of powdered coal is the ash problem. Its use in power plants is of doubtful efficiency, but for cement kiln heating it is ideal.

M. E. M.

Cost of atomizing fuel. CHAPLIN TYLER. *Chem. Met. Eng.*, **32**, 323(1925).—Figures are given showing equipment cost, fixed charges and maintenance, cost of steam, and cost of air, for fuel oil installations of various sizes.

M. E. M.

Definition of the expression "Ceramics." Report of the international chemical union. *Chimie et Ind.*, **1924**, special number, 411-4.

W. S.

Natural gas in Canada and its uses. R. T. ELWORTHY. *Can. Inst. of Min. and Met.*, *Bull.* **155**, 1925.—Natural gas is found in commercial quantities in 3 provinces in Canada, New Brunswick, Ontario, and Alberta. E. discusses the uses of natural gas; the compn. of Can. natural gas; natural-gas gasoline; carbon black; helium; and the indus. chem. produced from natural gas. Natural gas, for which there is no domestic demand at present, has possibilities of becoming the basis of important industrial developments, if constant attention be given to the research problems involved.

O. P. R. O.

Steam generation under critical conditions. (Benson process.) D. BROWNLIE. *J. Soc. Chem. Ind.*, **44**, 213-9(1925).—Progress in the technique of steam generation has been greater in the past ten years than in all the previous period. The conversion of water on a practical scale into dry satd. steam under the critical conditions of 3200 lb. per sq. in. press. at 706°F (375°C) enables 30-35% thermal efficiency to be obtained from the raw coal to the switchboard. The MARK BENSON process generates steam at high press. in a narrow bore coil in such a manner that the troubles caused by ebullition are entirely avoided. The plant, as erected at Rugby, Eng., consists essentially of a very long coil of steel tubing $\frac{1}{4}$ " thick and $\frac{3}{4}$ " bore, arranged vertically between an inner and outer casing of refrac. mat. The coils are 8 ft. high and form the actual generator. On the top of them are subsidiary coils for super-htg. and the whole arrangement, approx. 17 ft. high and 7 ft. in diam., is htd. from the top by an oil blast while distilled water is passed in continuously at the bottom at 3200 lbs. press. The water traveling upwards reaches 706°F within 10% of the discharge end, and in the remaining 10% of the coil is slightly superhdt. at about 720°F, the press. all the time being 3200 lbs. Ebullition is thus eliminated.

H. H. S.

Cobalt: its production and uses. T. H. GANT. *Jour. Soc. Chem. Ind.*, **44**, 157-61(1925).—Cobalt occurs in the following forms, of which smaltite, cobaltite, and asbolite are the most important: coballite or cobalt glance, CoS_2 , CoAs_2 ; smaltite, CoAs_2 ; linnalite or cobalt pyrites, CoS , Co_2S_3 ; crythrite or cobalt bloom, $\text{Co}_3\text{As}_2\text{O}_8$, $8\text{H}_2\text{O}$; willyamite, CoS_2 , NiS_2 , CoSb_2 , NiSb_2 ; skutterudite, CoAs_3 ; asbolite, an impure mixt. of Mn and other metallic oxides contg. up to 30% CaO ; spacerocobaltite, CaCo_3 ,

and its hydrate remingtonite; safflorite, CoAs_2 ; glaucodot (CoFe), AsS . The chief sources of supply are Cloncurry, Queensland, and Nipissing, Ont. Speiss from Nipissing residues contains 17.55% Co, 18.82% Ni, 12.04% Fe, 8.15% Cu, 0.91% Ag, 6.69% S, 35.14% As, Speiss from Australian ores contains 43.14% Co, 1.0 Ni, 10.0 Fe, 30.03% As, 15.04% S. As prep'd. for commerce, cobalt "black oxide" contains 70% Co, "special oxide" 72% Co, and "prepared oxide" 75% Co. Nickel hydrate is recovered as a by-product, roasted, and graded as: "OG" contg. 68-70% Ni; "G" 73% Ni; DR 73-76% Ni. The "black oxide" of Ni contains 76-77% Ni. Ferro-cobalt is marketed in cubes contg. 10-15% Fe and 80-90% Co for use in the iron and steel industry. Thénard's Blue is $\text{CaO} \cdot \text{Al}_2\text{O}_3$; Rinnan's green, $\text{CaO} \cdot \text{ZnO}$ mixed with ZnO . Margarine blue is obtained by calcining 68 parts CaO , 16 Cornish stone, 12 flint, 4 whitening. BaCO_3 may be substituted for CaCO_3 , and ground pitchers introduced as well. Colors are more resistant to the action of the glaze if built up on the spinal type $\text{RO} \cdot \text{R}_2\text{O}_3$; e. g., $(4\text{CaO} \cdot 6\text{ZnO})\text{Al}_2\text{O}_3$. The defect of "ironing" may be remedied by adding Al_2O_3 or TiO_2 . "Flows blue" is obtained by putting white lead and salt in the saggars with the cobalt glazes. In pottery bodies, CaO acts as a whitener in the proportion of 1:2240 parts of dry body. It is best first ground with 10% china clay.

H. H. S.

Formation of Italian Ceramic Society. *Jour. Soc. Chem. Ind.*, **44**, 35(1925).—At the first congress of Italian ceramists, held in Turin, it was decided to establish a national ceramic society with headquarters at Pesaro.

H. H. S.

Artificial ruby and sapphire. F. WINTERER. *Tech. ind. schweiz. chem.-Ztg.*, No. 17/18, 180-3(1924).—Artificial ruby, made by melting Al_2O_3 to which mineral coloring matter has been added, consists of a mass of microscopic crystals having different optical properties from the mineral. It is employed principally in the watch-making industry. Natural rubies and sapphires from different localities vary in hardness and in sp. gr., the latter ranging from 4.0 to 4.3, the sp. gr. of the artificial ruby being 3.95. Analysis shows the minerals to contain besides Al_2O_3 , Mg, Zr, Ti, Be and Si. The Mg content of oriental ruby may reach 15%, and is presumably present as Mg aluminate. The other elements are believed to be present as salts. In the synthetic ruby Cr gives red, Co and V blue, Ti yellow, Ti + V green, Au brilliant red.

Heat losses from steam-line pipes. R. H. HEILMAN. *Blast Fur. Steel Plant*, **10**, 261-5(1922).—Data are given on bare pipes operating at temps. up to 427 together with curves and formulas, enabling ready solution of problems encountered in the calcn. of heat losses from bare and covered pipes. The general formula giving good results is $T_d = 272.5 h / [h + (564/D^{0.19})]$. T_d = temp. difference between canvas surface and room ($^{\circ}\text{F}$); h = total B. t. u. loss per hr. per sq. ft. of canvas; and D = outer surface diam. (inches). An example is given.

(C. A.)

Calculating the useful height of cupolas. M. M. KARNAOUKHOV. *Messenger tech.-écon. russe*, **1923**, 340-3; *Rev. métal.*, **21** (Extraits), 453-4(1924).—The "useful height" is the height from the axis of the tuyères to the bottom of the charging hopper, and is given with a sufficient degree of approximation by the formula: $H = [0.270D - \sqrt{0.0729D^2 - (49D^2/R)}]/0.0245$, in which H = useful height in m., D the diam. of the cupola in m., R the wt. of the charge in kg. The formula is deduced from Hueser's heat balance (*C. A.*, **7**, 1692) and holds for similar conditions. A more general formula is: $H = [(1 - K_1 - C)D \pm \sqrt{(1 - K_1 - C)^2 D^2 - (4K_3 K_2 D^2/R)}]/2K_3$, in which K_1 = chem. heat of the gases discharged/calorific value of coke, $K_2 = B_1 HR/AD$ = [phys. heat of gases discharged \times height $\times R$]/(calorific value of coke \times diameter), K_3 = (loss by radiation \times diameter)/(calorific value \times useful height). K is trying to det. the values of K_1 , K_2 and K_3 for other cases found in practice.

(C. A.)

Some moisture relations of colloids. II. Further observations on the evaporation of water from clay and wool. E. A. FISHER. *Proc. Roy. Soc. (London)*, **103A**, 664-75

(1923); cf. *C. A.*, **17**, 2466, 2528.—The study of the evapn. of H_2O from colloidal materials has been extended to kaolin and a ball clay. When the rate of evapn. is plotted against moisture content, the curve for ball clay does not show the curvature previously noted in a clay subsoil and attributed to shrinkage, although the ball clay also shrinks. This type of curvature is found only with materials which are mixts. of colloidal and non-colloidal substances, and is due to the simultaneous evapn. of imbibitional H_2O held by the colloid and of interstitial H_2O held as H_2O wedges between the soil grains. The former H_2O evaps. at a practically const. rate, while the latter evaps. at a rapidly diminishing rate. The bearing of these results on the evapn. of H_2O from wool fabrics is discussed. (C. A.)

An attempt to cheapen the production of zirconium dioxide. J. W. BAIN AND G. E. GOLLOP. *Can. Chem. Met.*, **7**, 35-8 (1923).—Brazilian zirkite runs 70 to 80% ZrO_2 ; only 55 to 65% of the Zr is actually present as ZrO_2 ; the remainder is silicate. In the Florida zirconia sands there is more Zr silicate and hence these sands are harder to treat. By passing dry Cl_2 or $COCl_2$ over heated Zr-bearing ore mixed with C, $ZrCl_4$ can be volatilized and pure ZrO_2 can be prepd. therefrom. The reaction is slow; the yields for Cl_2 are far from theoretical; and the process is difficult to carry out commercially. Fusions with (a) NaOH, (b) Na_2CO_3 , (c) niter cake and (d) KHF_2 are described in *C. A.* **15**, 3952. Of the soln. methods the best employs 66° Bé. H_2SO_4 . By using 2 pts. H_2SO_4 to 1 pt. ore and heating to approx. 275° for 1 hr., 1-7% of the ZrO_2 in some Brazilian ore is brought to soln. Higher temps. and longer time did not increase the yield. The usual methods of producing a pure ZrO_2 from the H_2SO_4 soln. are too expensive for com. work. After extg. the residue with hot H_2O , the ZrO_2 can be pptd. by boiling as basic sulphate (Pugh's pat. U. S. 1,316,107). To reduce the free H_2SO_4 to approx. half that of the ZrO_2 present, addn. of (1) $CaCO_3$, (2) $CaCl_2$ and (3) $CaCO_3 + CaCl_2$ were tried. B.'s and G.'s expts. show that Zr is retained by the pptd. $CaSO_4$, and that great diln. is necessary to bring down the ZrO_2 in appreciable amt. by boiling. By suitably adjusting the concns. and dilg. the filtrate about 40 times before boiling, about 75% of the ZrO_2 in soln. can be pptd. The ppt. merely requires washing and ignition. One sample so obtained gave on analysis 98.6% ZrO_2 . (C. A.)

Edward Goodrich Acheson. F. A. J. FITZGERALD. *Ind. Eng. Chem.*, **16**, 971 (1924).—Biography, with a portrait. E. H. (C. A.)

PATENTS

Porous concrete aggregate. BERNARD J. FALLON. U. S. 1,528,759, Mar. 10, 1925. The process of forming a clay product which consists in first firing a mass of clay in a kiln under oxidizing conditions, then in passing steam through the bed of burning fuel into the presence of the clay and continuing the firing of the clay in the atmosphere so produced.

Process of forming ceramic products. ALBERT V. BLEININGER. U. S. 1,528,908, Mar. 10, 1925. The process of forming ceramic products which consists in prepg. a ceram. mass contg. deflocculated clay mat., adding thereto a coagulating reagent to effect delayed chem. reaction, and placing the mixt. in a mold.

CERAMIC ABSTRACTS

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Abrasives

Method of grain classification. ANON. *Abbras. Ind.*, **6** [3], 90(1925).—A method is described of classifying abrasive grains into various fine sizes for glass polishing. The method is covered by U. S. patent No. 1,519,250. C. J. H.

Art

Greek pottery. F. LAMBERT. *The Pottery Gazette and Glass Trade Review*, **50** [573], 425-6(1925).—This is a report of a lecture given by Mr. Lambert at a meeting of the Art Section of the CERAMIC SOCIETY. P. D. H.

BOOK

Polychromy. LEON V. SOLON. With introduction by RALPH ADAMS CRAM, New York. *The Architectural Record* (1924). Price \$6.00. H. H. S.

Cement

Silicate of soda and concrete. Valuable hardening properties of "P. 84 Silicate." ANON. *Chem. Age*, **12** [291], 33(1925).—The silicate which contains a higher percentage of silica than water glass is applied to the dried surface or existing concrete. The treated surface becomes hard and wear resistant. What is thought to happen when concrete is treated this way is that there is the formation of free silica in a hard colloidal form in the pores of the concrete. E. J. T.

Progress of the lime industry in 1924. U. V. S. KNIBBS. *Chem. Age*, **11** [289], 651(1924).—A brief survey of the general condition of the industry with notes on plants and processes. E. J. T.

The constitution of basic slag. T. P. COLCLOUGH. *Chem. Age*, **11** [273], 18-9 (1924).—A basic slag in the fur. may be regarded as essentially a mixt. of tetra-calcic phosphate and monosilicate of lime contg. in soln. greater or smaller amts. of oxides of Fe, Mn, with Al. MgO and in special cases fluorspar, the function of the latter being purely a phys. one, to give greater fluidity to a slag of the required lime content. E. J. T.

Reviving "dead" modifications of calcium sulphate. P. P. BUDNIKOFF AND M. E. LEWIN. *Ber. Poly. Iwanwo-Wosniessensk*, **8**, 32-9(1924); *J. Soc. Chem. Ind.*, **44B**, 172-3(1925).—Anhydrite or dead-burned plaster can be revived by addition of suitable reagents like NaOH, Na₂HPO₄, NaHSO₄, CaO, MgSO₄, MgCl₂, ZnCl₂, and Al₂(SO₄)₃. As the gypsum crystallizes, the catalyst separates at the surface. A cement produced by addition of 1% NaHSO₄.H₂O gave strength tests of 29.5 kg. per sq. cm. after 3 days, 32.8 after 7 days, and 49.1 after 28 days. H. H. S.

Building materials in 1924. W. J. REES. *Ann. Rept. Soc. Chem. Ind.*, **9**, 297-303 (1924).—A noteworthy event of the year was the Internat. Cement Congress held in London in April. (1) A number of papers on *ciment fondu* indicates the interest in

this quick-hardening cement. Port. cement mfrs. have responded with a true Port. cement that gives tests higher in 24 hrs. than are demanded by the Stand. Specif. at 28 days. Ferrocete, one of these new brands, carried a load of 6 tons on a 6 x 10 inch concrete beam of 15 ft. span at an age of 2 days, and a load of 10 tons at 7 days. (2) KÜHL, and GUTTMANN and BIEHL, have investigated the action of fluorspar in a cement mix. Cements which, when rapidly fired, will not stand the boiling test, showed no cracking when 5% fluorspar was added. Addition of fluorspar has no effect on strength at 28 days. Addition of fluorspar 5-10% reduces the temp. required to form cement clinker from 1270° to 1100°. G. and B. say that 3% is the max. for safety, an excess causing the clinker to disintegrate. Calcium sulphate, according to K., is a good mat. to grind with slags. The best strengths were given by a mixt. of 86 slag, 8 lime, 3-9 CaSO₄, and a mixt. of 70 slag, 30 clinker, 2-10 CaSO₄. (3) Pamphlet No. 3 of the Brit. Port. Cem. Research Assoc. deals with the exothermic reactions in clinker formation. It is computed that the heat evolved during clinker formation is about 40 million B.t.u. per 100 tons of clinker. TROCHE has discussed the use of calcium chloride in protecting cement and concrete from frost. Mortars composed of equal vols. of cement and sand with 10-15% anhyd. CaCl₂ do not freeze at -5° to -10°, and setting does not commence until an hour after mixing. (4) The addition of silicate of soda to concrete when gaging is recommended by MUNRO, particularly with ref. to its use for roads and factory floors. The concrete is rendered very resistant to abrasion, and the tensile and crushing strengths are not reduced.

H. H. S.

What is alite? Newer investigations regarding constitution of the Portland cement clinker. WALTER DYCKERHOFF. *Zement*, **13**, 455-7, 467-72(1924).—The author claims that the α -bicalcium silicate is the carrier of the alite in the Port. cement clinker.

W. S.

High valued cement and strength of concrete. DAHLKE. *Zement*, **13**, 481-2 (1924).—Comparing pressure tests on shaft kiln cement of the mixtures 1:3, 1¹/₄:3, 1¹/₂:3, 2:3, first with stand. sand and then with wall sand plus gravel.

W. S.

Destructions of concrete and ferro-concrete buildings in gas and water works. Causes and protection. E. PROBST. *Gas und Wasserfach.*, **67**, 513-5(1924).—The destructions are caused mostly by attacks of soda water or fluids contg. sol. sulphates on the Ca contents of the cement.

W. S.

Contribution for finding the values of lime in manufacturing of silica brick. H. SCHILLING. *Chem. Ztg.*, **48**, 787(1924).—In the lime employed the CaO content is to be determined because 2% CaO figured for the fired brick are necessary. Long storage of the lime is to be avoided.

W. S.

Storage of Portland cement which diminishes the quality. Grinding the clinker at the place of construction. ADOLF SPENGLER. *Tonind.-Ztg.*, **48**, 1157-8(1924).—Cement stored in dry bags loses 60% of its original strength during two years. Clinker can be shipped cheaper than cement, and it is sometimes more economical to grind the clinker where it is used; e. g. canal constructions.

W. S.

Enamel

Use of metal, enameled, and porcelain vessels in manufacturing pharmaceutical preparations. D. H. WEBSTER. *Arch. Pharm.*, **262**, 575-7(1924); *J. Soc. Chem. Ind.*, **44B**, 189(1925).—Plates of various mats. were boiled with four pharmaceutical liquors and with normal NaOH and H₂SO₄. Porcelain was the best, and enameled metal the worst, resistant mat. Intermediate in order were: Krupp's Nirostastahl V₂A; German-silver; copper, brass, tombak and phosphor-bronze, these four being approx. equally liable to attack; aluminum; and tin.

H. H. S.

The protection of iron at red heats with a metal coating. G. KUTSCHER. *Keram. Rundschau*, 33, 55-6(1925).—The destruction of iron at red heats is considerable due to the oxidation of the same. Molten Al is sprayed on the same after it has been sandblasted and the aluminum unites with the Fe. In the subsequent firing the Al is oxidized to Al_2O_3 which is very refrac. and thus the Fe is protected with a coating of refrac. Al_2O_3 . The spraying of grate bars with Al in this manner has greatly prolonged the life of these. Metal spraying is used for many other purposes. It is claimed that a metal spray may be put on combustible mats. as paper, wood, and cloth as well as on metal, stone, unglazed porcelain, plaster, etc. The metal to be sprayed on other mats. is fed into the spray gun as a wire. The wire is melted and sprayed by means of gas and compressed air of 2.2 atmos. The capacity of one of these spray guns varies with the fusibility of the metal to be sprayed varying from 6 kg. for easy melting metals to 0.8 kg. for metals which melt with difficulty. A thickness of $1/30$ – $1/20$ mm. is usually sprayed on grate bars while ware coated to make it resistant to chems. is now being coated with a thickness of $2/10$ – $5/10$ mm. It is very important that the metal surface to be sprayed be rough and freshly sand blasted as the metal will not stick as easily to smooth surfaces which have not been sandblasted. The use of acids to clean the surface is not necessary.

H. G. S.

The behavior of metal oxides in ground coats on sheet metal. L. VIELHABER. *Keram. Rundschau*, 33, 53-5(1925).

H. G. S.

The importance of fluorine compounds in enamels. W. ESCH AND F. SCHULTZ. *Chem. Ztg.*, 48, 901(1924).—The history of the use of Na_2SiF_6 is reviewed. (C. A.)

PATENTS

Charging fork for enameling furnaces. FRANCIS M. KOCH. U. S. 1,534,649, April 21, 1925. A charging fork for furs. including means for moving the fork into the

fur, coöperating mechanism set in opern. by said inward movement of the fork for automatically moving the fork vertically within the fur, and coöperating mechanism set in opern. by said vertical movement of the fork for automatically withdrawing the fork from the fur.

Glass and enamel. GENERAL ELECTRIC CO., LTD. Brit. 223,837,

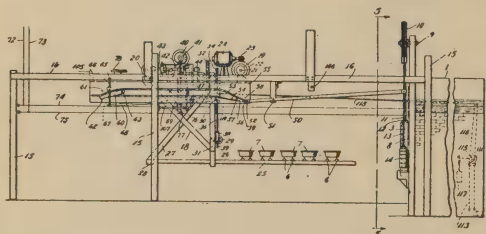
June 24, 1923. Glasses or enamels of low m. p. are formed of the following compn. (by mol. proportions): PbO 1, B_2O_3 0.45–0.55, SiO_2 0–0.20, Al_2O_3 0.04–0.20, Na_2O 0.04–0.07, K_2O 0.01–0.02, As_2O_3 0–0.01 and Co_2O_3 0–0.04. The Co_2O_3 may be replaced by other coloring or opacifying agents. These compns. melt generally at 360 – 400° and are suitable for marking elec. lamp bulbs and for use as an adhesive between metal, glass, porcelain and other materials or for coating glass or metal articles. (C. A.)

Enameling ceramic wares. V. M. GOLDSCHMIDT. Norw. 40,171, Nov. 3, 1924. After it is fired for the first time the article is moistened with an aq. soln. of a boron compd. and fired again. (C. A.)

Glass

The influence of barium carbonate in glass. ANON. *Keram. Rundschau*, 33, 192(1925).— BaCO_3 because of its strong fluxing action and cheapness is continually being substituted for PbO in the glass industry. Like PbO this oxide produces a glass with a high index of refraction and only costs about $1/5$ as much. H. G. S.

The fuel consumption in different glass furnaces. H. BARTH. *Keram. Rundschau*, 33, 191(1925). H. G. S.



Strass glass. R. SCHMIDT. *Keram. Rundschau*, **33**, 51-3(1925).—Strass glass is that type of glass which is used as the base for artificial gems. The early types of this glass had a compn. as follows: SiO_2 46%, K_2O 9%, and PbO 55%. The more recent strass glasses contain less PbO and considerable B_2O_3 . The compn. of such a glass is as follows: SiO_2 55%, B_2O_3 11%, Na_2O 5%, K_2O 13%, and PbO 16%. This glass has a lower index of refraction than the high PbO glass but is more brilliant due to the B_2O_3 . It however is a little too soft so a third strass glass has been developed which is made harder by substituting CaO for some of the PbO . A glass of this compn. is as follows: SiO_2 51.3%, B_2O_3 5.0%, Na_2O 2.2%, K_2O 12.3%, CaO 4.4%, and PbO 24.8%. The compns. of many other strass glasses are given in this article. H. G. S.

Sorption of ammonia and carbon dioxide by glass. Time and pressure relationships. D. H. BANGHAM AND F. P. BURT. *Jour. Phys. Chem.*, **29** [2], 113-29(1925).—The rate of sorption of ammonia by a glass surface at 0°C was measured at a number of different and approximately const. press. The relationships $S^m = K p_t \int_0^t p_t dt$, where S is the sorption value at time t , p_t the momentary pressure and m a (nearly) constant number of about 12, was found to hold for all press. and times over the exptl. range investigated. Except for a temporary derangement, the equation was still found applicable when the press. was suddenly increased or diminished in the middle of an expt. Similar expts. with CO_2 yielded analogous results. With this gas, however, the index was not const. but varied appreciably with the press. to which the sorption-value was much more sensitive. While for strictly const. press. expts. with ammonia it was concluded that $\log S$ would be a (nearly) linear function of $\log (p_t^2)$, for CO_2 , under the same conditions, $\log S$ would be a (non-linear) function of $\log (p_t^5)$.

E. J. T.

Optical glass. J. W. FRENCH. *Proc. Roy. Phil. Soc. Glasgow*, **52**, 113-37(1924); *J. Soc. Chem. Ind.*, **44B**, 170(1925).—A brief history and description of the manuf. of optical glass. H. H. S.

Allotropy of glass. H. LE CHATELIER. *Compt. rend.*, **179**, 718-21(1924); *J. Soc. Chem. Ind.*, **44B**, 170-1(1925).—In a previous paper Le C. advanced an equation $\log \eta = -Mt + P$, representing viscosity as a function of temp., and inferring that below 800° glass exists in an allotropic form. He now compares the calculated values with the exptl. work of S. ENGLISH and indicates on a diagram the points corresponding with allotropic change for three different types of glass. H. H. S.

English Pyrex glassware. G. E. STEPHENSON. *Jour. Soc. Chem. Ind.*, **44**, 299-300 (1925).—The Wear Flint Glass Works, Sunderland, are the British licensees of the patents taken out from 1914 onward by the Corning Glass Works of this country. The process of manuf. is described. H. H. S.

Annealing and re-annealing of glass. W. M. HAMPTON. *Trans. Opt. Soc.*, **26**, 14-30(1924-5); *J. Soc. Chem. Ind.*, **44B**, 207-8(1925).—A series of equations is deduced showing the relationship between initial strain, strain due to cooling gradient, and final strain. The equations were applied to different types of glass of varying thickness. Conditions of re-annealing were examined with regard to temp. and for annealing and cooling times to be a minimum. The effect of errors in temp. meas. and in the rate of cooling is also studied. A scheme of annealing to cover the cases considered is given in tabular form. H. H. S.

Glass in 1924. E. A. COAD-PRYOR. *Ann. Rept. Soc. Chem. Ind.*, **9**, 214-25 (1924).—The most important work published during the year deals with viscosity and surface tension at high temp. (papers by WASHBURN, SHELTON and LIBMAN; and by S. ENGLISH). W. deals with soda-lime glasses, and E. with Na_2O , CaO , MgO , Al_2O_3 , and B_2O_3 glasses. E. comments on the difficulty in handling magnesian glasses; they adhere to the Pt wire, or to the gathering-iron in working practice, and cannot be re-

moved by heating and quenching. Boric glasses, as noted by many writers, show a discontinuity in properties suggestive of the formation of a compd. more resistant than sodium borate or sodium silicate. Devitrification is the cause attributed to apparent anomalies in variation of viscosity with temp. in many glasses. GRIFFITH (*Phil. Trans.*, **221A**), using a highly aluminous glass (12% Al_2O_3) and a different method, found a surface tension 400 dynes per cm., as compared to WASHBURN'S 150 for soda-lime glass. An important paper by TOOL and EICHLIN gives evidence on the formation of mol. aggregates in glass at temps. near to the annealing temp. The work was carried out chiefly on a boro-silicate glass of annealing temp. 520° . The shape of the thermal curves below 500° and 600° and the quantity of heat evolved, vary considerably according to the previous heat treatment, but for any temp. there appears to be a definite condition of equilibrium which is a function of that temp., although at low temps. the mobility is too low to permit the glass to reach a state of equilibrium. Quenched glasses show a decrease of density if chilled from temps. above annealing temp., but an increase of density by 0.2% if chilled from 490° . No relation was observed between density and double refraction. The authors conclude that from any temp. a certain state of mol. aggregation is stable at that temp. Fatigue in glass is shown by BRAIN (*Proc. Phys. Soc.*, **36**, 81(1924)) in expts. on the piezoelectric phenomena shown by a number of dielectrics. On loading the specimens, charges were developed which with small loads were proportional to the load, but plate and window glass showed considerable fatigue after previous loading, the charges developed falling from 0.04 to 0.02 E. S. U. The elec. condy. of glass was found by Schönborn to follow the law $\log W = V/T + C$, where W is the spec. resistance, T the abs. temp. and V and C constants depending on the compn. of the glass (see also Sutton and Silverman, *Jour. Amer. Ceram. Soc.*, **7** [2], 86(1924)). In all the glasses a discontinuity in condy. is observed at temps. corresponding to the well-known discontinuity in coeff. of expansion. The coloring action of S and Se in glass is attributed by FEDOTIEV and LEBEDEV (*Z. anorg. chem.*, **134**, 87(1924)) to the formation of sulphides and selenides. H. H. S.

Some recent developments in furnaces and gas producers for glass works. J. S. ATKINSON. *The Pottery Gazette and Glass Trade Review*, **50** [573], 430-2(1925).—This is a report of a paper read by A. at a meeting of the Society of Glass Technology. The "Torpedo" type of glass tank as developed by T. C. MOORSHEAD is described. The merits of this tank are listed as follows: (1) By eliminating the corners which the ordinary rectangular design fur. has, a more rapid and uniform circulation is obtained. (2) The construction of the bridge, flared out as it is from the center of the fur., makes it possible to ventilate or cool the side wall blocks much more efficiently. (3) The effective melting area is not reduced, but the vol. of glass in the tank is reduced, thus giving higher melting efficiency. The author also dealt with recent developments in gas producers, referring especially to the latest Chapman completely automatic producer, which is giving excellent results. P. D. H.

Irish glass, old and new. SIR HERBERT JACKSON. *The Pottery Gazette and Glass Trade Review*, **50** [573], 433-6(1925).—This is a report of a paper read by J. at a meeting of the Royal Society of Arts. Irish glass except for the blown varieties is unusually heavy. It has a peculiar depth of tone best described as a steel or gray-blue color. The cause of the gray color is unknown but it is probably due to some impurity in the lead used. Irish glass is tougher, stronger and more resilient than English. With regard to ring or sound, it has a distinct note of its own which is a vibration between two or three tones given forth with a throbbing effect. The ring of English glass is clearer and sharper. The new Irish glass described is still made by hand from old Irish recipes but is new in design. P. D. H.

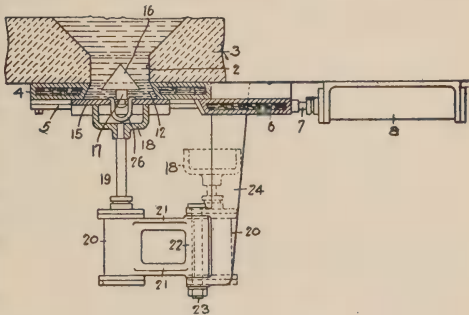
PATENTS

Porous glass heat-insulating material. J. H. DELANY. Brit. 222,965, July 12,

1923. Molten glass is treated with Zn vapor or other material which on condensation within the glass mass forms vacuous cavities. Building brick, receptacles for food and other articles may be formed from the resulting product. (C. A.)

Hardening glass. R. HIRSCH and SCHOTT & GEN. Brit. 223,353, Aug. 21, 1923. Glass articles to be hardened while hot are subjected to the chilling action of air blasts or are dipped in liquid. A glass is used having a cubical coeff. of expansion not exceeding 200 times 10^{-7} . (C. A.)

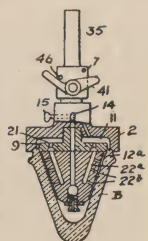
Method and apparatus for casting plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,530,629, Mar. 24, 1925. App. for casting plate or rolled glass comprising a glass-receptacle having a downwardly opening outlet, a fluid-cooled ring disposed immediately beneath and around said outlet, a hollow fluid-cooled knife mounted for reciprocation beneath said outlet, and means for withdrawing solidified glass formed in said outlet by the chilling action of said ring and said knife. The method of casting plate or rolled glass that comprises permitting glass to flow through a downwardly opening outlet, interrupting the flow of glass through said outlet, chilling a portion of the glass adjacent to said outlet, and removing and discarding the plug of chilled glass thus formed, thereby opening said outlet for the discharge of another portion of glass. The method of casting plate or rolled glass that comprises permitting glass to flow through a downwardly opening outlet, interrupting the flow of glass through said outlet, chilling the bottom surface of the glass within said outlet to form a holding plug for the glass thereabove, and removing said plug of chilled glass to thereby open said outlet for the discharge of another portion of glass.

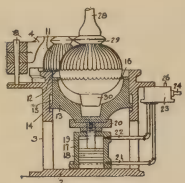


Process and apparatus for controlling the feeding of glass. WILLIAM J. MILLER. U. S. 1,532,254, April 7, 1925. The process of maintaining uniformity in gathers of glass produced by an automatic feeder which consists in regulating the amt. of glass in a gather being formed by the feeder by the amt. of glass in a preceding gather.

Means for transporting glass articles. WILLIAM J. MILLER. U. S.

1,532,255, April 7, 1925. In combination with mechanism for transporting hollow articles of glass, a vacuum gripper for said mechanism comprising a member contoured to circumferentially fit the wall of the article from without, a second member mounted in unison therewith and contoured to fit the wall of the article from within, said members being spaced apart to form a chamber which is closed by the article when the gripper engages an article, and means for applying a vacuum to said chamber.

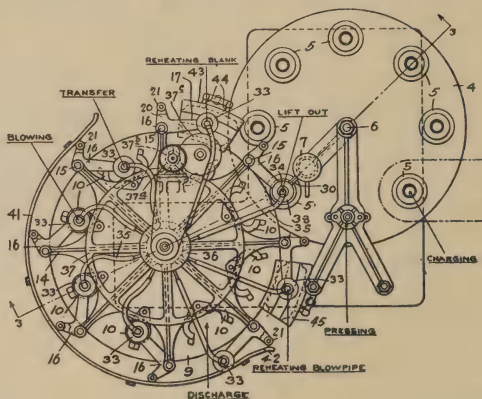




Mold for making glassware. FREDERICK W. STEWART. U. S. 1,532,162, April 7, 1925. A mold for forming articles of glassware comprising an upper mold part made up of horizontal swinging sections, the inner walls of said mold part having flutes formed therein terminating in scallops, a vertically movable lower mold part having scallops at its upper edge engaging with said first named scallops, a cylinder, a piston, connections between said lower mold part and said piston, and means for admitting fluid to points above and below said piston.

Method of forming hollow glassware. FREDERICK W. STEWART. U. S. 1,532,163, April 7, 1925. The method of forming hollow glassware consisting in providing a sticking-up tool, heating said tool, pressing a blank, sticking-up the open-end of the blank, introducing the blank into a blow-mold, and blowing the blank with air admitted through the sticking-up tool.

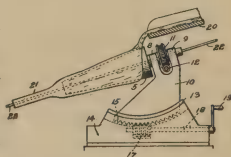
Machine for making bottles or vials. JOSEPH CONDE. U. S. 1,530,884, Mar. 24, 1925. In a mach. of the character described, the combination of a supporting trackway having a declivity, blank supporting means in register with said declivity, glassworking



mechanism positioned to act on the blank while the latter is supported by said means, an endless conveyor for feeding the blank along said trackway with the blank supported on the latter, and means to operate said conveyor continuously, whereby the blank upon reaching the declivity descends the latter ahead of the conveyor and temporarily dwells on said supporting means during the action thereon of said glass-working mechanism whereupon the conveyor having caught up with the blank transports it onwardly from said supporting means.

Ornamental glass and process of making it. FREDERICK GELSTHARP. U. S. 1,531,089, Mar. 24, 1925. A process of making ornamental glass, which consists in continuously forming, from a body of molten glass, a ribbon or sheet having a chilled, slightly roughened surface, and during such formation, and while the sheet or ribbon is setting, maintaining such a relatively high temp. for such time as to produce a bright lustrous finish without removing the surface irregularities which give it its rough appearance.

Method of manufacturing glass rods. PETER P. KUCERA. U. S. 1,530,728, Mar. 24, 1925. The method of continuously forming reinforced glass rods which consists in flowing molten glass along a hollow rotating support, controlling the rate of flow of the molten glass passing a rod longitudinally through the support and drawing a rod around the wire from the molten glass at one end of the support.



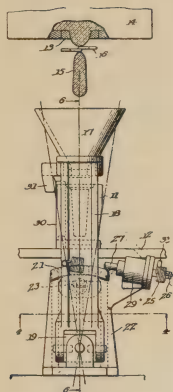
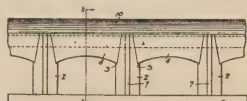
Glass furnace. FRANK E. TROUTMAN. U. S. 1,530,628, Mar. 24, 1925. A glass melting fur. comprising piers and arches each formed of a single block of refrac. mat.,

said piers and arches having horizontal projecting ledges formed on their inner faces, and a crown disposed between said arches and piers and above said ledges, said ledges serving to protect the adjacent surfaces of said crown and said arches and piers from the direct action of the hot gases in the fur.

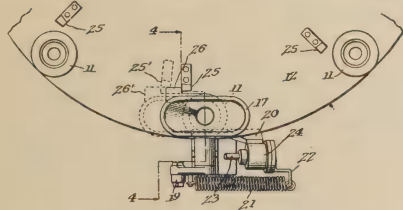
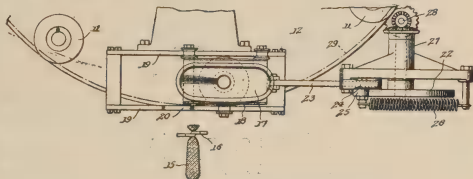
Traveling funnel guide for glass-forming machines.

JAMES W. LYNCH. U. S. 1,531,559, April 14, 1925. A

traveling funnel guide for forming machs. having moving molds traveling in a curvilinear path, comprising a supporting member having a universal joint mounting, means for guiding the supporting member in a path parallel to the path of movement of the molds, a funnel carried by said supporting member, and engaging means moving with the molds for engaging and moving said funnel in time with successive molds.



carrier, said funnel having an elongated hopper and a spout arranged above the plane of the filling openings of said molds, means to reciprocate said carrier and funnel to and fro on said track to coincide with the passage of successive molds, and means for tilting said funnel carrier as it moves to and fro to swing the funnel spout laterally sufficiently to keep it in alinement with the path of movement of said molds.

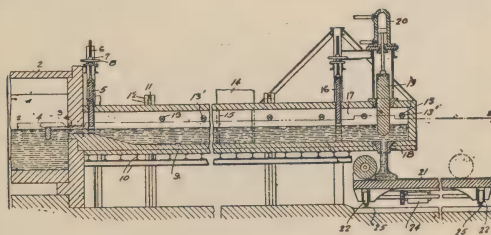


Traveling funnel guide for glass-forming machines. JAMES W. LYNCH. U. S. 1,531,561, April 14, 1925. A traveling funnel guide for forming machines having moving molds traveling in a curvilinear path, comprising a supporting member movable in a path substantially a chord of said curvilinear path, a funnel carried by said supporting member with its throat immediately above

the open tops of said molds during their movement through the arc subtended by said chord, and engaging means moving with the molds for engaging and moving said funnel in time with successive molds.

Process of making plate glass.

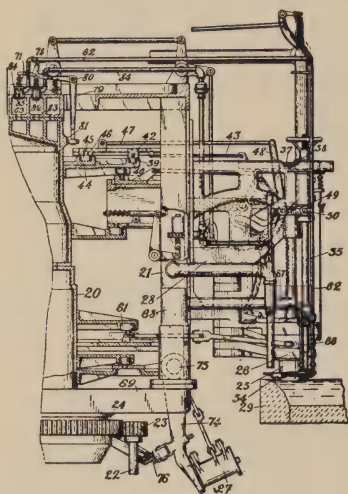
FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,535,061, April 21, 1925. The method of casting molten glass that comprises flowing the glass through an outlet upon a casting table, advancing a casting table beneath said glass outlet, and



regulating the amount of glass received on said table by controlling the speed at which said table advances.

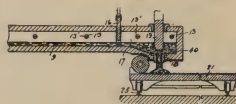
Glass-forming machine. THOMAS STENHOUSE and LEONARD D. SOUBIER. U. S. 1,534,036, April 21, 1925. In a glass forming mach., the combination of a mold, means to

charge the mold by suction, a rock shaft, a cutter carried thereby, means to rock said shaft and thereby swing the cutter across the end of the mold to sever the glass, means to open the mold after the glass is severed, and a burner carried by said rock shaft and moved thereby into operative relation to the glass after the mold is opened.



Apparatus for making plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,535,062, April 21, 1925. In apparatus for making

flat glass, the combination of a melting fur., a shallow runway of materially greater length than width communicating with said fur., means independent of said fur. for controlling the temp. of the glass at the outer end of said runway, a receptacle adapted to receive glass from the outer end of said runway



and having a discharge opening in its bottom, a casting table adapted to move beneath said opening, and means for forming the glass on said table into a sheet.

Method of laying plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,535,063, April 21, 1925. The method of laying flat glass on a grinding or



polishing table that comprises lifting a plurality of pieces of glass by means of suction applied to the upper surface of the glass and fixedly limiting the relative upward movement of the upper surfaces of the said pieces so as to bring all of the said upper surfaces to the same level.

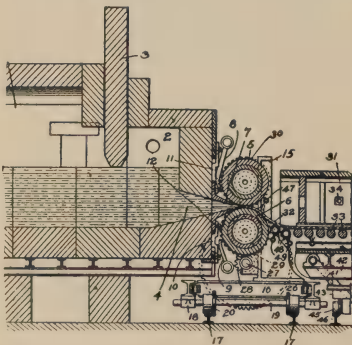
Apparatus for laying plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,535,064, April 21, 1925. App. for laying flat glass upon grinding or polishing

tables, comprising a suction device adapted to engage and support the glass to be laid, and rigid seating means for permitting the surface of the glass engaged by said suction device to be alined in a definite plane.



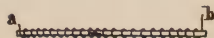
Method and apparatus for making sheet glass. FREDERICK GELSTHARP. U. S. 1,532,134, April 7, 1925. App. for forming sheet glass,

comprising a receptacle containing a bath of molten glass and having an outlet passage through its wall below the surface of the glass, a pair of fluid cooled rolling members spaced apart with the space therebetween adjacent the passage and in opposition thereto, a pair of lip members at the outer end of the passage projecting between the rolling members and serving as shields for the rolling members to reduce the area of contact between such rolling members and

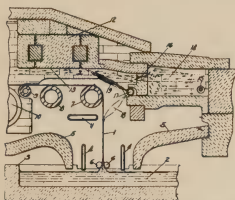


the glass, and means for rotating at least one of the rolling members to govern the speed of movement of the glass therebetween.

Process for shaping glass tubes, more particularly tubes with rarefied gas, intended for lighting or luminous advertising. GEORGES CLAUDE and JEAN MARIE EDOUARD DE BEAUFORT. U. S. 1,534,685, April 21, 1925. A process for shaping glass articles, comprising the successive steps of winding insulated wire around the article to be shaped; passing an elec. current through said winding to soften the glass; shaping the softened article while the winding is in place thereon; shutting off the current; and removing the winding from the shaped article after the latter has cooled.



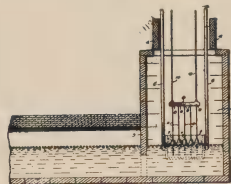
Drawing and flattening sheet glass. CLYDE W. BELDEN and INGLE B. BUSARD. U. S. 1,534,567, April 21, 1925. In a sheet glass drawing app., wherein the sheet is drawn vertically from a bath of molten glass and then bent into the horizontal plane, means for reheating the sheet in its horizontal run, comprising a member of heat radiating mat. under which the sheet moves, a source of heat for heating this member, and an auxiliary heating means adapted to interchangeably play against either the vertical run of the sheet or the radiating member.



Method of drawing glass and apparatus therefor.

WILLIAM E. HEAL. U. S. 1,532,182, April 21, 1925. The

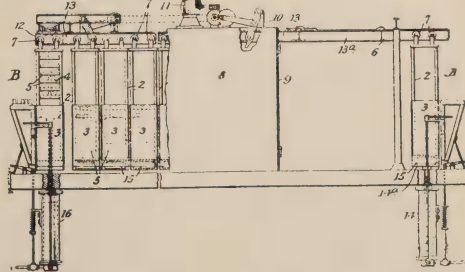
method of drawing glass which comprises lowering a box-like receptacle having spaced slots in its side walls, into a body of molten glass, raising said receptacle and maintaining it above said body of molten glass whereby the glass in said receptacle will tend to flow through said slots by gravity and return to said body of molten glass, and drawing sheets of glass from the glass in said receptacle.



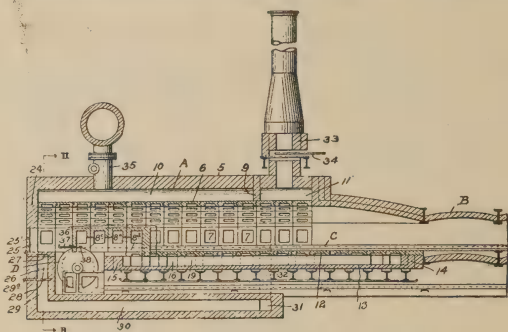
Apparatus for annealing glassware. GEORGE G. OLIVER and THOMAS STENHOUSE. U. S. 1,534,863, April 21, 1925. In app. for annealing glassware, an annealing leer having inlet and discharge ends and also having an antechamber, an annealing chamber and a cooling chamber arranged endwise of each other, dividing means between each two of the chambers, containers for a plurality of trays of glassware, a suspension for each of the containers, an overhead trackway along which each suspension moves, and means for moving each of the containers successively from chamber to chamber during the annealing operation.



Apparatus for tempering glassware. GEORGE G. OLIVER and THOMAS STENHOUSE. U. S. 1,534,864, April 21, 1925. In app. for annealing glassware, a receptacle comprising an inner container and an outer container, the inner container having a closed top and bottom and a series of shelves having open sides, and an outer container having closed walls open at top and bottom, the inner container being adapted, when filled with ware, to rest in the lower portion of said outer container, the side walls of the outer container and the top and bottom of the inner container comprising a complete closure for excluding air during annealing.



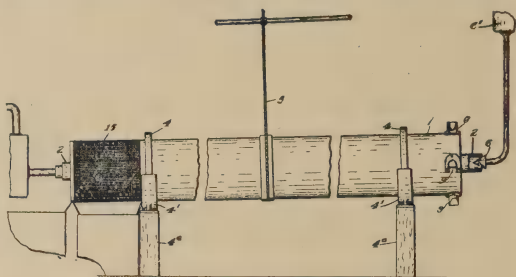
Annealing furnace and leer. WALTER O. AMSLER. U. S. 1,533,298, April 14, 1925. A heating chamber for leers comprising an outer wall, an inner wall, which inner wall encloses a muffle chamber, means for circulating heated gases between the inner and outer walls, means for introducing articles at the side of the muffle chamber, and



means for circulating the heated gases around the muffle chamber to the rear of the point where the articles are introduced into the muffle chamber. A heating chamber for leers comprising an outer wall, an inner wall enclosing a muffle chamber, an endless conveyor in the chamber, supporting wheels for the conveyor extending into the muffle chamber, vertical side flues for circulating heated gases between the outer and inner walls, and passages connecting

those of the side flues adjacent the wheels whereby the portion of the muffle chamber into which the wheels extend may be heated by circulating gases thereabout.

Rotary drier. WILLIAM A. HARTY and FRANK W. MOORE. U. S. 1,531,438, April 14, 1925. A drier comprising a rotary shell, a screen at the discharge end of said shell, and an internal heating pipe extending through said screen and rotating with said shell.



Heavy Clay Products

The Carver economy wall. ANON. *Brick & Clay Record*, 66 [4], 279-90(1925).—This is a very complete description of the new type of brick wall recently designed by William Carver. Numerous sketches explain every detail of construction. Tables are given showing strengths, costs and heat conduction properties of various walls.

P. D. H.

Results of tests of combination hollow tile and reinforced concrete floor slabs. A. H. STANG. *Brick & Clay Record*, 66 [4], 277(1925).—These results are of compression tests conducted at the Bureau of Standards. It is shown conclusively that the tile in combination floors is effective in helping to withstand the shearing and bending stresses to which the floor is subjected. It appears that the tile add about 50% in width to the concrete. That is, where a 4-inch joist had been previously used, a 6-inch could be used with safety.

P. D. H.

Pressing and firing of dry press bricks. P. THOR. *Tonind.-Ztg.*, 48, 969-70 (1924).—A description particularly regarding the control of the moisture content.

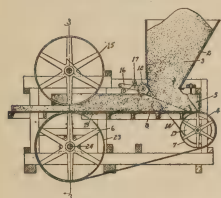
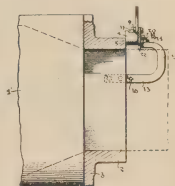
W. S.

Why a drying plant alongside the kiln is preferable to one above the kiln. RICHARD SEYDEL. *Tonind.-Ztg.*, 48, 955-6(1924).—Eleven reasons why drying plant should be level with the ground.

W. S.

PATENTS

Facing mechanism for tiles and bricks. OSCAR B. ENEVOLD and ERICH H. ARNDT. U. S. 1,531,908, Mar. 31, 1925. A facing mechanism comprising a plurality of spaced combined guide and supporting devices adapted to be secured to the front of a die of the clay forming mach., a pair of spaced combined guide and retaining members adapted to be secured to the front of the die of the clay forming mach. and arranged to extend in close proximity to, forwardly and to one side of said devices, and a reciprocatory facing element interposed between said devices and members and slidably supported on said devices at the front thereof, said element positioned in the path of the clay as it leaves the mach. to act on one face of the clay.

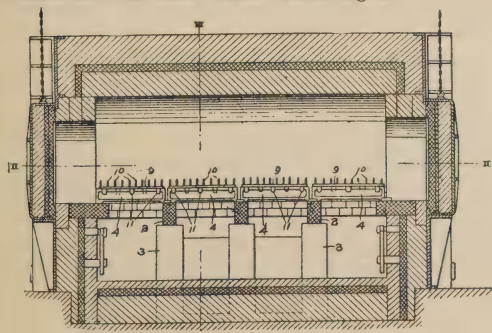
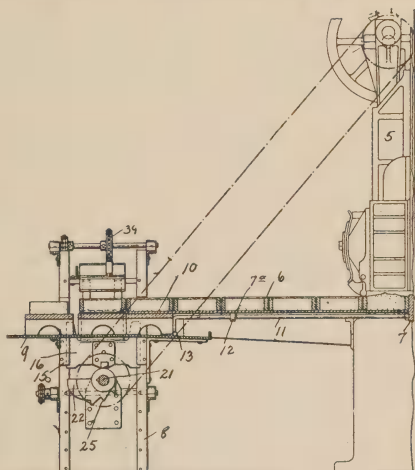


Brick machine. DAVIS BROWN. U. S. 1,534,768, Apr. 21, 1925. In a brick mach., a plurality of wheels for shaping the sides of a clay column, means for actuating the wheels and belts for feeding the clay to certain of the wheels, one of said wheels having a portion extending within the edges of two of the belts for compressing the clay.

Brick-molding machine. MAURICE BRYAN LOOMIS and EDWARD BURROWS LOOMIS. U. S. 1,531,296, Apr. 21, 1925.

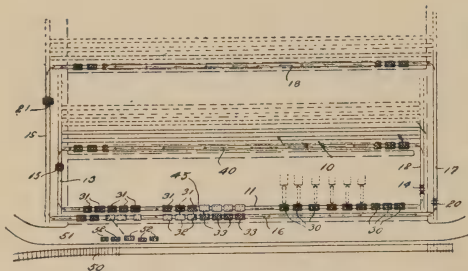
In combination with the delivery table of a soft mud brick making mach. and bottomless molds therefor, a supporting structure adjacent the end of said table, pallets for receiving the filled molds from the delivery table, a driven shaft, cams keyed on the shaft, teeth on each of the cams, lifting plates for engaging the molds, lugs on said lifting plates coöperating with the teeth of the cams to jar the brick free from the molds and means for retaining the elevated molds above the pallets.

Enameling furnace. ALAN D. DAUCH. U. S. 1,532,621, April 21, 1925. An enameling fur. having in combination therewith a plurality of beams or members arranged in spaced relation within the fur. and racks consisting of



a plurality of longitudinal sections provided with pins for supporting articles and detachably supported by said beams or members.

System and apparatus for trafficking tile during manufacturing. GEORGE W. DENISON. U. S. 1,531,739, Mar. 31, 1925. In a plant for mfg. ceramic products the combination of a closed cycle of trackage, said cycle including tracks whereby trucks carrying the product may traverse a drying oven,



and parallel stretches of tracks whereby the dried product carried by trucks on one track may be transferred to trucks on another track, the routing of which circumscribes the path of the first track and which includes a stretch of track traversing a firing oven.

Refractories

Research possibilities in refractories. M. C. BOOZE. *Brick & Clay Record*, **66** [4], 294-6(1925).—This article deals with the methods of improving the quality and reducing the production costs of refracs. The following problems for invest. are discussed. Labor saving devices; miscellaneous plant equipment; auger machs. and dies; method of controlling water at pug mill or wet pan drying; firing; calcining; control of size; and purification of clays.

P. D. H.

New use for sillimanite. W. J. REES. *Jour. Soc. Chem. Ind.*, **44**, 359(1925).—Sillimanite may be used for making semi-permanent molds for repetition castings in iron, steel and other metals. The high refractoriness of sillimanite and its small drying and firing shrinkage when bonded with up to 15 or 20% fire clay renders it particularly suitable for this purpose.

H. H. S.

Centrifugal method of making small pots of electrically fused refractory materials. F. S. TRITTON. *Proc. Roy. Soc.*, **107A**, 287-90(1925); *Jour. Soc. Chem. Ind.*, **44B**, 208(1925).—Powdered MgO , Al_2O_3 , or ZrO_2 , is rotated in a cup-shaped mold and is meantime fused by an arc between two carbon rods dipping into the central part of the mold. The time required to produce a pot is 15 min. Tendency to form carbides, in the case of Al_2O_3 or ZrO_2 , is eliminated by directing a stream of O into the mold.

H. H. S.

Action of blast-furnace and open-hearth slags on fire brick, and on silica and magnesite bricks. J. PRELLER AND V. KÖRBER. *Chem. Listy*, **18**, 383-9(1924); *J. Soc. Chem. Ind.*, **44B**, 173(1925).—Corrosion is increased by a rise in the proportions of free FeO and MnO in the slag, by a decrease in the viscosity of the slag, and by an increase in free silica in the brick. Severity of corrosion is inversely proportional to the density of the brick and to the amt. of sillimanite formed in the parts of the lining in contact with the slag.

H. H. S.

Investigations regarding silica brick. E. STEINHOFF. *Stahl u. Eisen*, **44**, 1277, 83(1924).—The author investigates the influence of transformation of silica brick after firing (3 diff. types) on the stability in the kiln; tables curves and illustrations are given.

W. S.

Trace heat lost through walls. M. L. HARTMANN AND O. B. WESTMONT. *The Foundry*, **53**, 219-20(1925).—The thermal condy. of carborundum brick was measured by the method of DUDLEY, using a wall built of stand. 9-in. brick laid with mortar of the same compn. The following conclusions were drawn: The thermal condy. of pure carborundum is const. for temps. from 650-1350°C. The thermal condy. of ceramically bonded carborundum increases with increasing temp. The thermal condy. of carborundum refracs. decreases with increase in % of fire clay bond, and the temp. gradient through a wall increases with increase in % of fire clay bond in the brick. The thermal condy. of fire clay is inversely proportional to the porosity. At any given temp. the thermal condy. of carborundum increases as the amount of heat energy transmitted is increased. With fire clay the condy. is independent of the amt. of heat energy transmitted.

M. E. M.

Refractories for oil-burning boilers. T. S. CURTIS. *Mech. Eng.*, **67** [4], 299 (1925).—Two causes for short life of fire brick in oil-burning boilers are (1) softening under loads at temp. hundreds of degrees below m. p. and (2) spalling. Softening is due to incipient vitrification. Spalling is exaggerated to rapid htg. and cooling. A third destructive influence is the throbbing or pulsating of the oil flame. A brick has been produced from purified California clays which is dense, free from impurities and glazed with a sillimanite coating; an interlocking shape is provided to minimize the destructive effect of the vibration of the oil flame.

C. J. H.

Refractories in 1924. W. J. REES. *Ann. Rept. Soc. Chem. Ind.*, **9**, 284-92 (1924).—Reference is made to papers published in *Jour. Amer. Ceram. Soc.* by BUCKNER, HENRY, PRESSLER, ROSE, NORTON, BOOZE and FLINT, ROBSON and WITHROW, and BOWEN and GREIG, and to the bibliographies of silica and magnesite refrac. published by this SOCIETY. The transmission of heat through refrac. was the subject of a number of papers. GREEN (*Gas. J. Suppl.*, July 9, 31 (1924)), shows that thermal condy. increases with temp. of firing, and at lower temps. decreases with increasing porosity. Brick with high grog content have at the higher temps., a higher FOURIER'S diffusivity and thermal condy. than those with low grog content, while the reverse is the case below 1000°. It is suggested that at high temps. transmission of heat by convection and radiation in the pore spaces increases. HALLIMOND has discussed the formation of eutectics and similar structures in slags and silicate melts. With fine-grained slags the pattern of the fret is best examined under vertical illumination, the minerals of low refractive index having the weakest reflecting power. It is pointed out that a "graphic" structure of interlocked outlines is not necessarily indicative of a eutectic. A similar structure is given by solid solns. homogeneous at the crystg. temp. The mech. strength of a refrac. at high temps. is frequently a detg. factor in its durability, and attention is being given by numerous workers to relationship between compn., texture, normal refract., and refract. under load. MELLOR considers that the difficulty in finding a relationship is due to a great extent to the difficulty in distinguishing between the two distinct types of fracture, the one due to a mech. breaking down of the mat., and the other due to gradual subsidence under the load. DALE states that the temp. at which subsidence under load begins is independent of the grog content, but the temp. at which complete breakdown occurs is lower with brick contg. grog than with straight clays. The discovery and exploitation of large deposits of sillimanite in India is regarded as a matter of first importance. The refractoriness of this native mat. is cone 38. The increasing use of silica brick for lining coke-ovens and the construction of gas-retorts indicates that this matl. will supplant fire clay or mixts. of fire clay and silica for these purposes. Spinel refrac. in this country of m. p. cone 38 are alluded to.

H. H. S.

Refractory materials. V. C. FAULKNER. *Chem. Age.*, **12** [297], 179 (1925).—A paper read before the Institute of Metals. The points emphasized in the paper were summarized as follows: (1) High fusion point, apart from chem. desiderata, is not the α and ω of a refrac. mat. (2) That the heat of condy. is perhaps equally important. (3) Plastic refracs. suffer from this defect, and should be incorporated with refracs. of better heat-conducting properties. (4) Cementing mats. should be kept to a minimum, and this can only be done by insisting on the dimensional accuracy of the brick used. (5) That both mass and local press. on the brickwork should be kept to a minimum, the latter being also helped by the dimensional accuracy of the brick used. (6) That refrac. walls should be twice coated with a refrac. cement, and that a fine finish should be given so as to obtain a glaze, with the object of (a) exposing a minimum surface to light and heat rays, and (b) a mat. under no real press. (7) That British silica brick are not fired at sufficiently high temp. and that as a result they expand too much on htg., which can preclude the use of plastic refrac. coatings.

E. J. T.

PATENTS

Production of surface layers on refractories which are metallic conductors and act as katalyzers. ARTHUR WILHELM. Suisse Pat. 103,657, Oct. 10, 1922. On the surface or on the inner wall of refrac., which contain oxides of silicium, titanium, zirconium; iron, chromium or manganese in an atmosphere of H a light metal and an oxide of a light metal above the m. p. of the light metal but below the softening point of the refrac. are acted upon. Metallically conductive layers are produced. The products serve as elec. heat radiators; also as katalyzers. W. S.

Composite quartz body. ELIHU THOMSON. U. S. 1,532,002, Mar. 31, 1925. The method of making a plate of quartz having a regular, unbroken surface which



consists in heating quartz sand in a mold to cause coalescence of the particles, thereby forming an opaque mass, and then facing said mass by local fusion with a layer of clear, homogeneous quartz.

Refractory furnace lining. DANIEL H. MELOCHE. U. S. 1,534,237, April 21, 1925. The method of protecting and repairing the refrac. lining of a fur. which consists in first heating the refrac. surface of the fur. to between 300° and 500°F, then painting the heated surface of the fur. with a wash containing not over 10% of sol. silicate in soln. and a considerable quantity of powdered fire clay in suspension, then heating the surface of the fur., then applying another thin coat of fire clay with the sol. silicate binder, again heating the surface of the fur. and repeating the operation until the desired thickness of fire clay is applied to the surface of the fur.

Manufacture of silica bricks. JOHN WILSON. U. S. 1,534,199, April 21, 1925. The herein described method of mfg. highly refrac. brick, which consists in intimately mixing china clay and lime each in a finely divided condition with natural siliceous stone also in a finely divided condition, the percentage of china clay being of the order of about 2.5% and that of the lime about 1.5%, and forming the mixt. into brick.

Making refractory articles and the like. ANSON GARDNER BETTS. U. S. 1,533,689, April 14, 1925. Process of making a refrac. article which consists in molding comminuted refrac. acid-insoluble mat. with an aqueous aluminum salt, in a metal mold, heating mold and contents driving off volatile matters, forming the contained mix to a solid physically dry article, and separating the same from the mold.

Ceramic and refractory materials. C. E. KRAUS. Brit. 224,257, May 1, 1923. The plasticity of ceramic materials, refractory compns., mortars, etc. contg. clay, kaolin, bauxite, flint, asbestos, CaCO₃ or similar ingredients is increased by the addn. of 5-20% of a highly colloidal earth such as bentonite, ehrenbergite, damonterolite or montmorillonite, with or without cork or other combustible substances which are burnt out to produce porous heat-insulation. (C. A.)

Whitewares

A new tile-glazing machine. CLIFTON REYNOLDS. *The Pottery Gazette and Glass Trade Review*, 50 [573], 429-30(1925).—This is a report of a paper read by R. at a meeting of the Parent Section of the English Ceramic Society. P. D. H.

A lecture on English pottery. BERNARD RACKHAM. *The Pottery Gazette and Glass Trade Review*, 50 [573], 442-5(1925).—This is a report of a lecture given by R. of the Victoria and Albert Museum, South Kensington, England. P. D. H.

Lead poisoning in English potteries. *Jour. Soc. Chem. Ind.*, 44, 353(1925).—The Ministry of Health states that the number of cases for the four years 1921 to 1924 were 35, 42, 44 and 47, making a total of 168 in all. H. H. S.

Solubility of glazes and enamels used in cooking utensils. G. W. MONIER-WILLIAMS. Ministry of Health, London, England, Report No. 29 (1925); *Jour. Soc.*

Chem. Ind., **44**, 262(1925).—Representations having been made to the Ministry of Health that imported earthenware casseroles, dishes and similar articles were glazed with a raw lead glaze of high lead content, a number of these vessels were subjected to the action of hot 1% citric acid soln. and of various foodstuffs. While there is no serious risk of lead-poisoning arising from ordinary use in cooking, yet under certain conditions in domestic usage excessive quantities of lead may be dissolved. The imported ware showed lack of care in the prepn. and firing of the glaze. Investigations were also carried out on enameled hollow ware, on account of the outbreak of lead-poisoning in 1922 due to the use of lead-enameled tanks for the storage of beer, and it was found that the danger of injurious subs. being taken up by foodstuffs from domestic enameled ware was remote. This article is reprinted in *Chem. Age*, **12** [296], 155(1925) and *The Pottery Gazette and Glass Trade Review*, **50** [573], 439-40(1925). H. H. S.

Ball clay. HANS HIRSCH. *Tonind.-Ztg.*, **48**, 1155-7(1924).—Examples of rich clays which allow a diminishing of the plasticity to a great extent. Discussion of properties which allow one to determine numerically the practical value of the clays. Moistening, extension, tensile strength, softening under pressure, colloidal structure.

W. S.

Technical tests of raw materials in porcelain factories. G. KLITZKE AND H. TROPITZSCH. *Keramos*, **3**, 505-7(1924).—A short discussion of the usual methods of testing to obtain an approx. survey of the qualifications of the raw mats. without having scienc. accurate results.

W. S.

Heat balances of a porcelain round kiln. G. KOPKA. *Keramos*, **3**, 495-8(1924).—The tests were made on a three-floor round kiln. Thermal efficiency of 17% of a furnace before and 32.5% after being rebuilt according to modern methods. W. S.

Potters clay. ARTHUR HOLLINS. *Chem. Age*, **11** [283], 10(1924).—A paper read by A. Hollins on improperly pugged clay and its effect on (a) the wage earning capacity of the operatives; and (b) the loss by defective wear to the employers. The various faults of pugging are pointed out. Suggestions were made for the storing and maturing of clay; and the grading of pugged clay to suit the several branches of the trade.

E. J. T.

China clay in a new pottery line. ARTHUR HOLLINS. *Chem. Age*, **11** [283], 9(1924).—Church Bank Pottery announced the successful making of British fire-proof cooking ware. The base itself is china clay, ball clay, calcined flint and stone, quartz, or feldspar. The ware is fine textured and highly resistant to thermal shock.

E. J. T.

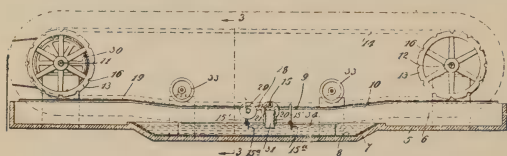
Influence of the glaze upon the physical properties of porcelain. E. GEROLD. *Keram. Rundschau*, **33**, 188-90(1925).—It was found that different glazes had a marked influence upon the following properties of high tension porcelain insulators: (1) modulus of elasticity, (2) tensile strength, (3) modulus of rupture, and (4) resistance to impact. The same glazes tested on different bodies influenced the properties of these bodies in the same way. The glazes did not only change the properties of thin bodies but also had a marked influence upon the thicker bodies. The influence of three glazes upon the properties of a porcelain was studied. It was found that all three glazes increased the elasticity coeff. Two glazes decreased and one increased the tensile strength. Two glazes decreased and a third increased the modulus of rupture. Two glazes decreased the resist. of the porcelain to impact while a third did not influence the body very much in this respect. Expts. were conducted to determine the influence of grinding these glazes off upon the properties of the porcelain. It was found that the modulus of rupture and the resistance of the body to impact became practically the same as the unglazed body after the glazes had been ground off. The elasticity coeff. was somewhat higher on the body from which the glaze had been ground off than that of the unglazed body. Expts.

were also conducted to determine the influence of slowly grinding off the glaze of the porcelain and then grinding off the outer skin of the body upon the tensile strength off the body. It was found that as the glaze was slowly ground off the tensile strength approached that of the unglazed body. As the outer skin of the body was ground off the strength of the porcelain decreased quite markedly, showing that the outer skin imparts strength to the porcelain. The influence of these glazes upon the properties of insulators 72 mm. thick was almost as great as upon bodies 20 mm. thick.

H. G. S.

PATENTS

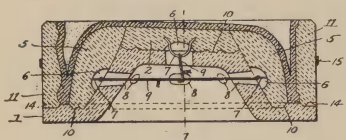
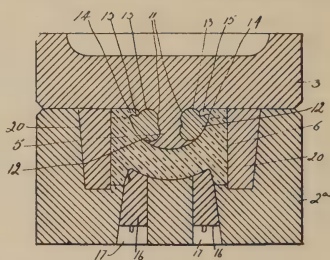
Method and apparatus for enameling brick or tile. JOHN FRANCIS BOORAEM. U. S. 1,531,839, Mar. 31, 1925. In combination with a trough adapted to contain an



enamel bath, means for moving articles through said bath, said means including spaced article supporting devices, and additional means movable with said article supporting devices for effecting a movement of the enamel bath

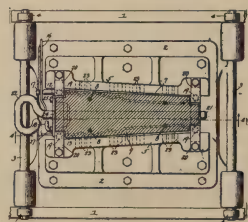
mat. at the same rate of speed as the speed of movement of the articles through said mat.

Mold for pottery work. WILLIAM BERNARD BUTLER. U. S. 1,534,155, April 21, 1925. A mold for producing articles from highly shrinkable mat., consisting of a base, a body, a face and a top section, so assembled as to be readily disassembled, an insert removably set in the base for forming a portion of the base of the article to be molded, two inserts removably set in the body for giving contour to the back of said article, an offset carried by the face section, two spline plugs removably fitted to said offset, said plugs and offset constituting that portion of the mold for forming the undercut inside of said article and an insert forming a portion of said offset.



Bathtub mold. ABEL HANSEN. U. S. 1,534,779, April 21, 1925. A mold for forming clay objects, comprising a core member constituted of a base having openings therethrough, and mold-forming sections applied thereto with means for securing the sections to the base and to each other.

Apparatus for making porcelain legs. ABEL HANSEN. U. S. 1,534,780, April 21, 1925. In a mold for forming porcelain legs in combination, a lower and an upper half, side guides in which said halves have vertical play, and end plates slidable on the side guides and having central orifices for holding a core rod.



Equipment and Apparatus

Applications of electric control for clay plants. T. B. HEUSTIS. *The Clay-Worker*, 83 [3], 249-54(1925).—A car hump is described and shown in a sketch on which the motor is started automatically when a car is to be elevated and is stopped in a similar manner when the car has reached the top. An overhead crane and mechanical setter are described, as well as an automatic app. used for loading pallets of brick on drier cars. There is a de-

scription of a one-man elec. transfer car together with a complete sketch. This car is equipped with a reach arm motor which drives the transfer. An electrically driven reel cutter is described. The power for driving the cutter is taken direct from a variable speed motor, the speed of which is maintained at a fixed ratio to the speed of the belt by a differential governor. A new type of hacking mach. is also described.

P. D. H.

Temperature measurements with thermoelements. J. WÜRSCHMIDT. *Z. Metallkunde*, **16**, 271-4(1924).—Many of the values published for the thermoelec. power of thermocouples do not state whether they are mean values for 1° over a temp. interval or whether they are the values of the thermoelec. power for a difference of 1° at a definite temp., e. g., the value for a Pt-Pt 10% Rh couple for 1° at 0° is 4.3, at 100° 5.18, and the mean value 0- 100° , 4.74 microvolts. New detns. of the thermoelec. power for a no. of couples over the same temp. range show that the property is, within the limits of exptl. error, strictly additive. With constantan as the standard (0) the thermoelec. power of Ni is 21, V2A alloy 40, Fe 53, and chromin 59. Burgess found values on this basis for Ni 20, 10% Rh-Pt 24, and Pt 29.

(C. A.)

Fischer-Bauer's modification of the Fischer viscometer. E. P. BAUER. *Chem. Ztg.*, **49**, 96-7(1925).—The Fischer viscometer (cf. *C. A.*, **14**, 3340) is not satisfactory for measuring the viscosity of materials like suspensions. B. describes an app. with which viscosities of all kinds of liquids can be measured with an accuracy of ± 1 to 2%. The app. works on the principle described by Doelter and Sirk (cf. *C. A.*, **6**, 957) and by Albert (cf. *C. A.*, **18**, 2620). The time required for a counterbalanced sinker to fall through a known height of the liquid is measured. Relative viscosities are thus obtained. Absolute viscosities are detd. by calibrating the instrument with a liquid of known viscosity.

(C. A.)

A rapid weighing torsion balance. RESEARCH STAFF OF THE GENERAL ELECTRIC CO., LTD. (E. M. EDEN and H. W. B. GARDINER). *J. Sci. Instruments*, **2**, 119-24 (1925).

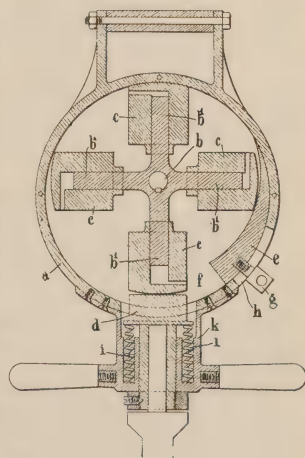
(C. A.)

PATENTS

Impact device. NICOLAS GEORGEVITCH. U. S. 1,531,549, Mar. 31, 1925. An impact device or hammer having an impact member slidable under the influence of centrifugal force and means for moving the impact member against the action of the centrifugal force and for suddenly releasing the same just before the moment of impact.

Clamp for glass molds. THOMAS STENHOUSE. U. S. 1,534,878, April 21, 1925. A clamp for molds, including a piston rod, a cross-head mounted for limited sliding movement thereon, clamping jaws pivotally mounted on the crosshead, means for moving the crosshead and jaws

bodily forward to a fixed position, and means for causing the jaws to swing inwardly into clamping position after the determination of the forward bodily movement.



Kilns, Furnaces, Fuels and Combustion

Conservation of fuel. CARL B. HARROP. *The Clay-Worker*, **83** [3], 255-60 (1925).—This article deals with the saving in fuel from the firing of clay products in

tunnel kilns. A table is given showing the types of ware fired in a number of tunnel kiln installations, the type of fuel used, the construction cost, the yearly saving and total saving in fuel.

P. D. H.

The economy of kiln insulation. E. C. LLOYD. *The Clay-Worker*, 83 [4], 345-8 (1925).—It has been shown by actual tests that approx. 9% of the fuel used in firing may be saved by 4 1/2 inches of insulation on the kiln crown. With the side walls and bottom insulated the saving would be doubled. A sketch shows the method of insulating round down-draft kilns. The method of insulating a tunnel kiln is shown in a cut.

P. D. H.

Timely advice in firing (No. 2). ANTON VOGT. *The Clay-Worker*, 83 [4], 344 (1925).—While it is impossible to save much fuel during water-smoking it is possible to save time by firing more rapidly. This is not likely to injure the ware if there is sufficient draft to carry off the steam as fast as it is formed. In order to produce sufficient draft a fur. should be built at the stack and kept burning until the water-smoking is completed. The time saved will pay for the fuel consumed in the stack fur. many times over. In order to determine when the ware in the kiln is dry it is much better to insert a rod in the bottom peephole of the door than in the stack flue, for the flue itself may be sufficiently damp to cause moisture to condense on the rod. Much time is lost and fuel wasted by firing too slowly during the oxidation period. Light frequent firings will advance the heat gradually and expel the carbon in the least possible time. Trials should be drawn, as the bluish vapor may be caused by the coal instead of by the carbon in the clay.

P. D. H.

The problem of firing. A. V. BLEININGER. *The Clay-Worker*, 83 [3], 267-8 (1925).—It is possible that the system of firing with an induced draft is wrong in principle. The induced draft with its tendency to form streams of gases in the kiln and to induce an enormous leakage of air into the kiln through the many openings is not conducive to more rapid firing nor to an even heat distribution nor to fuel economy. Forced draft is suggested instead of the induced draft. This system would involve the introduction of the air to the furs. under the grates by means of a blower, delivering the air at from one-half to several ounces per sq. in. A positive press. in every part of the kiln instead of a negative press. or suction, would be more apt to accelerate the rate of firing from the very beginning of the water-smoking, to promote the oxidation and to insure a more uniform distribution of temp. with a mat. reduction in the firing time. It also eliminates the loss due to leakage of air into the kiln. This system would lend itself readily to the opern. of the kilns on a semi-continuous principle by connecting them.

P. D. H.

Fuel mixing. R. C. GANGEWERE. *The Clay-Worker*, 83 [3], 254-5(1925).—This paper deals with the mixing of powdered fuel with clay. Anthracite coal and coke gives the best results. Ashes having an appreciable carbon content are also used.

P. D. H.

The C. F. B. patent enamel kiln. ANON. *The Pottery Gazette and Glass Trade Review*, 50 [573], 419(1925).—The novel feature of this kiln consists chiefly in the formation of a ridge on the back vertical edge of the quarries, which are thus enabled to mortice into recessed mid-feather brick. The latter are built up in the kiln leaving a channel all the way around, and a sinuous course is provided along which the gases have to pass, it being impossible for them to enter the kiln chamber. Any existing kiln can be readily converted to the new system by the replacement of the quarries and mid-feather brick.

P. D. H.

Firing brick and tile with oil. CARLTON GEIST. *The Clay-Worker*, 83 [3], 260-2 (1925).—This article deals principally with the Geist oil burner, its design and construction, principles of opern. and efficiency.

P. D. H.

The process of firing in shaft kilns with forced-in fuels. ALBERT HAUENSCHILD. *Zement*, **13**, 495-9(1924).—The process is started by a gasification of the C, which reduces to CO with the CO₂ escaping from the mat. It burns on the surface of the pressed coal after escaping through its pores. If more C is forced in than the amt. equivalent to the CO₂ the atmosphere becomes reducing. This also happens if the pieces of the fuel are too large. To obtain the best conditions the clinker must be burned very porous.

W. S.

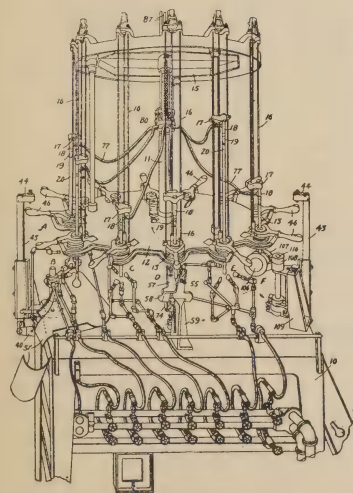
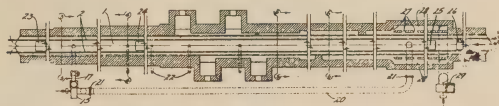
A new type of mechanical stoker. ANON. *Chem. Age*, **11** [275], 292(1924).—A new type, being a traveling grate compartmented air supply stoker, the "Underfeed Type C" which is on new lines and is both claimed to have eliminated riddlings altogether and to render possible the firing of refuse fuels in a fine state of division. The design is essentially that of a traveling laminated steel belt, having links of thin flat segments of steel only $\frac{1}{4}$ in. wide so that the air supply is highly sub-divided and the fuel does not fall between. The whole grate is watercooled.

E. J. T.

Cost of industrial heating. D. J. DEMOREST. *Chem. Met. Eng.*, **32**, 381-2(1925).—A table is given showing the cost per 100,000 B.t.u. of 7 different fuels when fired in fur. operating at 400°, 1600° and 2300°F, both with and without recuperation. M. E. M.

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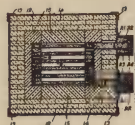
Method and apparatus for treating clay ware in tunnel kilns. CARL B. HARROP. U. S. 1,531,181, Mar. 24, 1925. The method of treating clay ware in a tunnel kiln which comprises passing the htg. gases in direct contact with the ware and controlling the velocity of the gases to regulate the amount of ht. imparted to the kiln walls and to the ware at different zones in the kiln. A tunnel kiln which is constructed internally with clearances between the ware setting and the kiln walls of varying area at different locations.



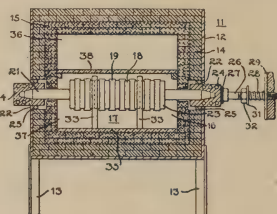
Automatic glass-blowing machine. HARVEY E. QUACKENBUSH AND CLEVELAND H. QUACKENBUSH. U. S. 1,532,077, Mar. 31, 1925. An air distributing device comprising two members movable relatively to each other one having an outlet port connected to a blowing mechanism and an inlet port and the other member having an outlet port adapted to register with the inlet port of the first mentioned member, an inlet port connected to a source of air pressure and a relief port, a closure for said relief port pivotally mounted adjacent thereto, a notched member mounted adjacent to said closure and means for causing relative movement between said notched member and said closure to cause a swinging movement of the latter into and out of engagement with said relief port. In a mach. for forming bulbs from glass tubing, the combination of a support having mounted thereon a series of holders each adapted to receive

an end of a section of glass tubing, means adapted to operate upon the opposite ends of said tubing sections to fuse the same, and means connected to said holders for supplying air to said tubing sections at predetermined intervals in a series of puffs of predetermined duration.

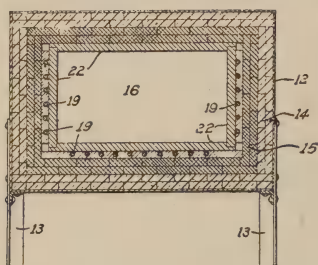
Electric resistance furnace. ORA A. COLBY. U. S. 1,533,224, April 14, 1925. In an electric-resistance fur., in combination, a plurality of refrac. walls surrounding a fur. chamber, a plurality of elongated refractory resistor members located in spaced-apart parallel relation, and a plurality of refrac. conducting blocks, each extending laterally of said resistor members and operatively supporting the ends of two adjacent resistor members and maintained in close operative engagement therewith by a superposed portion of said fur. structure.



Electric-furnace resistor. ORA A. COLBY. U. S. 1,533,231, April 14, 1925. In an elec. fur., in combination, a resistor comprising a plurality of refrac. electrical-conducting bars, alternately of rectangular and of I-beam section, interfitting and supporting each other, and a plurality of spaced thin refrac. plates operatively engaging certain of said bars to support said resistor.



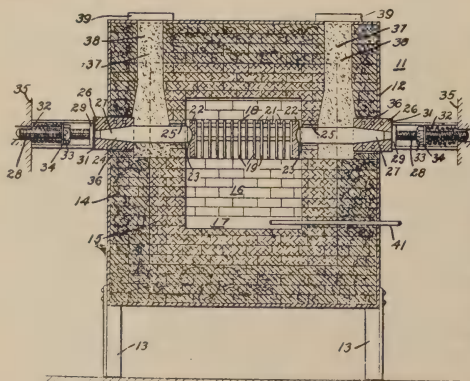
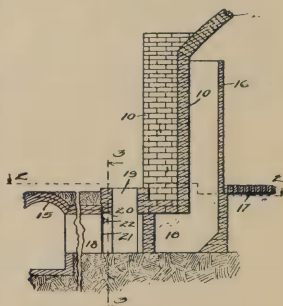
Electric furnace. ORA A. COLBY. U. S. 1,533,232,



April 14, 1925. In an electric fur. in combination, a plurality of refrac. walls enclosing a fur. chamber and having a plurality of spaced recesses therein, cleats in said recesses having a surface extending into said chamber provided with a plurality of laterally extending grooves therein and a resistor member extending through said grooves and between said cleats.

Waste-heat cooling system for periodic clay-burning kilns. ROYAL L. ASH. U. S. 1,533,999,

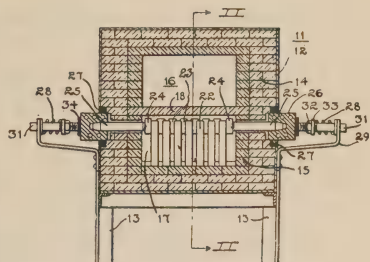
April 14, 1925. A waste heat cooling system comprising the combination of a kiln and a waste heat tunnel, with a flue arranged on the interior of the kiln, adjacent to the wall thereof, having its upper end open at the top of the kiln, a passage leading from the bottom of the flue to said tunnel, said passage having a port outside said kiln, a movable closure member in said passage between the port and the tunnel, and a false wall in the passage between the port and the flue.



Electric-furnace resistor. GEORGE M. LITTLE. U. S. 1,533,254, April 14, 1925. An electric fur. comprising a plurality of relatively thin, flat, carbonaceous plates, and a plurality of relatively short carbonaceous members, of skeleton form in lateral cross-section, located in spaced relation between the flat faces of said plates, and means for producing a sooty vapor in said fur., said plates embodying means for reducing the deposit of soot on said members of skeleton form.

Electric furnace. GEORGE M. LITTLE. U. S. 1,533,255, April 14,

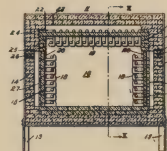
1925. An electric fur. resistor comprising a plurality of relatively thin, flat, refrac. plates, a plurality of current-conducting spacing members of relatively small area alternating with said flat plates and located adjacent the top portion thereof.



Electric-furnace resistor.

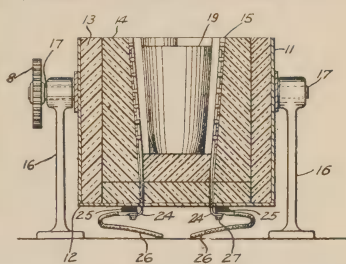
THOMAS A. REID. U. S. 1,533,264, April 14, 1925.

A resistor supporting means comprising a plurality of contiguous refrac. members, each having one end of L-shape for engaging and supporting a resistor member and means for loosely supporting said refrac. members.



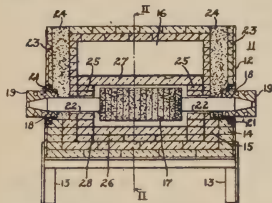
Electric crucible furnace. THOMAS A. REID. U. S. 1,533,265, April 14, 1925.

In an electric fur., in combination, a refrac. casing, a plurality of relatively thin refrac. plates, of arcuate form in lateral cross-section, each plate having a plurality of relatively small spaced, alined, integral projections on the outer surface thereof and the said plates fitting within said casing, and a resistor member located between said plates and said casing and operatively engaging said plates at their outer surface only, the said portions thereof being maintained in proper operative position relatively to each other by the alined projections.



Electric furnace. THOMAS A. REID. U. S. 1,533,269,

April 21, 1925. The method of protecting an oxidizable resistor member in a fur. chamber which comprises surrounding said chamber by a relatively thin layer of an initially granular mat. and heating said granular mat. to change the same to a substantially vitreous air-tight envelope.



Geology

Feldspars. ANON. *Pottery Gazette and Glass Trade Review*, 50 [573], 415-7(1925).—Some valuable deposits of feldspar, claimed to be the largest known, are located near Verona, Ontario, Canada and are being worked at the "Richardson Mine." J. W. MELLOR reported the feldspar as being of remarkably high quality, the following being an anal. of a sample taken from the ground

material as supplied to users: Silica, 64.36%; alumina, 20.06%; lime, 0.26%; magnesia, 0.26%; potash, 11.65%; soda, 2.74%; and iron oxide just a trace. P. D. H.

Chemistry and Physics

Determination of viscosities. GUY BARR. *Chem. Age*, 11 [277], 347(1924).—

A set of 4 oils whose viscosities at 25°C range from 0.14 to 6.5 poises and a series of Ostwald viscometers covering a larger range have been standardized. Abs. detns. were made on three oils using capillaries of 1.5 min. bore and the const. for a certain Ostwald instrument deduced (a) from these viscosities; (b) by a stepwise calibration starting from water; and (c) by calibration with sugar soln. The results agreed within

0.3%. The corrections required in the use of each of these methods are fully discussed in the report.

E. J. T.

Adsorption by precipitates. HARRY B. WEISER. *Jour. Phys. Chem.*, **28** [12], 1253-64(1924).—A study was made of the adsorption during the pptn. by electrolytes, of negative arsenious sulphide sol and of positive hydrous ferric oxide and hydrous chromic oxide sols both in the presence and the absence of phenol and isoamyl alcohol.

E. J. T.

Ceramics in 1924. W. J. REES. *Ann. Rept. Soc. Chem. Ind.*, **9**, 278-84(1924).—The reactions occurring during the firing of clays is still the subject of controversy. On the one hand, MELLOR's hypothesis is that at about 500° kaolinite dissociates into an amorphous mixture of SiO_2 and Al_2O_3 ; on the other hand there are hypotheses like that of VERNADSKY, which implies a gradual change from kaolinite to sillimanite without the formation of free Al_2O_3 at any stage. Both sides agree that the final product after high temp. heating is a mixture of sillimanite and silica. BOWEN and GREIG's paper on mullite, $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$, is discussed. VERNADSKY suggests that part of the water in kaolinite is "zeolitic water," and that the formula may be written $\text{Al}_2\text{Si}_2\text{O}_6(\text{OH})_2 \cdot \text{H}_2\text{O}$. OSTWALD and PIEKENBROCK have endeavored to characterize clays by viscosity measurements on suspensions. They found that factors other than temp. and concentration influence the values obtd. Comparisons should be made not at a definite concn., but by the construction of a viscosity-concn. curve by measurements after repeated dilution of the original suspension. There are indications of an optimum quartz content varying with the size of the quartz particles. The difference in clays and kaolins after mechanical treatment suggests that in kaolin suspensions viscosity is detd. by size distribution of particles, while in clays the principal factor is a stronger power of hydration and swelling. JOSEPH and HANCOCK have investigated the relationship between composition and properties of clays in homogeneous preparations obtd. by dialyzing, or repeatedly filtering through collodion, the flocculated water-suspensions. It is shown that the $\text{SiO}_2:\text{Al}_2\text{O}_3$ ratio is the most important chem. constant of a clay. This ratio is related to the chem. reactivity of the clay to NaOH and neutral electrolytes, the development of acidity in the latter case being regarded as a special case of base exchange. They propose to measure plasticity by means of some property which is modified by ignition and by electrolytes—e. g., the moisture equivalent. The purification of clays by sedimentation has been discussed by HIND. He considers that sedimentation after deflocculation notably reduces the amt. of iron in the clay but not TiO_2 , alkalis, and alkaline earths. Sedimentation gives a finer grained product, increases contraction on drying and firing, and increases refractoriness.

H. H. S.

Frost cracking. A. BIGOT. *Compt. rend.*, **180**, 287-9(1925); *Jour. Soc. Chem. Ind.*, **44B**, 171(1925).—A specimen of black Etruscan ware cracked on exposure to cold; this was due to insufficient dehydration of the colloidal clay, because a portion which had been heated to 850° did not show the effect although its porosity was increased. Brick of porosity 55%, after heating to 1200° so that all the colloids were pectized, did not crack. If a mat. ground to an impalpable powder, gives colloid reactions, the mat. will tend to crack.

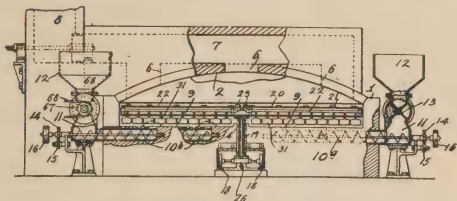
H. H. S.

Observations on structural-chemical silicate formulas and crystallographic-chemical decomposition and rearrangement of mica by dehydration, oxidation and reduction. F. RINNE. *Ber. Verhandl. Sächs. Akad. Wiss. Leipzig*, **76**, 261-71(1924).—Muscovite and biotite were heated to 1000° in N_2 and in air and the latter was subsequently reheated in $\text{N}_2\text{-H}_2$ at the same temp. Comparison of the optical and Röntgenographic properties in the original and heated specimens led to the conclusion that in dehydration no change of crystal structure takes place. Oxidation is accompanied by marked change of optical properties but subsequent reduction completely restores the

original properties. This is caused by deformation of at. shells through loss or gain of electrons in the reversible transformation $\text{Fe}^{\text{II}} \rightleftharpoons \text{Fe}^{\text{III}}$. The orthosilicate formula of mica cannot be regarded as certainly valid structurally since it takes no account of the fact that dehydration and oxidation and reduction of Fe are structurally insignificant phenomena. (C. A.)

PATENTS

Process of making chromates. GEORGE P. FULLER. U. S. 1,531,088, Mar. 24, 1925. The process of making chromates which consists in roasting, in an oxidizing atmosphere, a mix comprising a chrome ore, an alkali metal carbonate, and a relatively infusible alk. absorbent, at a temp. above the fusing point of the alkali metal carbonate, submitting the mat. thus obtained to successively lower temps. until it has cooled below the fusion point of the alkali metal chromate formed, and during this cooling agitating the mat. until a granular product is obtained.



Process for the treatment of leucite. BIRGER FJELD HALVORSEN, HANS JOACHIM FALCK, THOR MEJDELL, and ØYSTEIN RAVNER. U. S. 1,531,336, Mar. 13, 1925. The process of treating leucite which comprises dissolving the leucite in dilute nitric acid and neutralizing the acid soln. obtained thereby, evaporating and cooling so that mixed crystals of nitrate of potassium and nitrate of aluminium are pptd., that have an average content equal to $\text{KNO}_3\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$.

BOOKS

Textbook of metallography, chemistry and physics of the metals and their alloys. G. TAMMANN. Trans. from third German edition by R. S. DEAN and L. G. SWENSON. Pp. 388. New York: Chemical Catalog Co., 1925. Price \$6.00. H. H. S.

Report of the progress of applied chemistry. Vol. 9, 1924. London: The Society of Chemical Industry. Pp. 700. Price 7s. 6d. to members, 12s. 6d. to non-members. H. H. S.

General

Elimination of waste—simplified practice, what it is and what it offers. This booklet may be obtained from the Government Printing Office, Washington, D. C. for ten cents. It shows what the Dept. of Commerce will do in coöperation with industries on this important subject. It shows further what various industries have already accomplished by simplifying and standardizing sizes and varieties. P. D. H.

A visit to the osmosis plant at Carlsbad. S. R. HIND. *Pottery Gazette and Glass Trade Review*, 50 [573], 427–8(1925).—This is a report of a paper read by H. at a meeting of the Parent Section of the CERAMIC SOCIETY. The plant described is that of the Carlsbad Kaolin Electro Osmosis Co., at Porchezan, Chodau, near Carlsbad, whose works manager is Director W. Meyer. A flow diagram of the plant is shown. P. D. H.

Stone decay. J. J. FOX AND T. W. HARRISON. *Jour. Soc. Chem. Ind.*, 44, T145–T9(1925).—The injurious agencies which promote decay of stone may be put into 3 classes: (a) Atmospheric action of a mechanical nature, (b) chem. action, (c) living organisms. (a) The effects of weathering on poor stone are well known, but with sound stone weathering is of little consequence, and may enhance the appearance of the building. (b) The most serious cause of decay is the conversion of carbonate into sulphate and of cryst. sodium sulphate. (c) Lichens and mosses break up the surfaces of the stone, not only by the growth of their rootlets and hyphae, but also by the sol-

vent action of the carbonic and organic acids produced by them. There is no suggestion, however, that the action extends below the surface layer. *Bacterial action* is regarded by the authors as not proven. A universal stone preservative is regarded as difficult if not impossible.

H. H. S.

The Industrial Institute of Great Britain (*Jour. Soc. Chem. Ind.*, **44**, 338(1925)), has been formed for the study of the fundamental problems of industry. It will include statesmen, financiers, employers, trade unionists, scientists and university representatives. The principal object of the Institute is "to develop a descriptive science of the working of the industrial system, including production, distribution, and finance, especially from the point of view of human relations and ethical considerations, and to strengthen the foundations of the science of industrial ethics." It also proposes to promote research into these questions which touch the relations and interests of the groups into which the development of the industrial system has divided the nation.

H. H. S.

The Pasteur fund. *Jour. Soc. Chem. Ind.*, **44**, 358(1925).—The result of the collections on behalf of the scien. lab. of France during the Pasteur celebration in 1924 was to raise a fund of 12 million francs.

H. H. S.

The "Murray" wall. Water cooled combustion chambers. ANON. *Chem. Age*, **12** [291], 29(1925).—The "Murray" tube consists essentially in constructing the two combustion side walls of 4-in. steel tubes, placed close together, through which the boiler feed-water circulates entering a common header at the bottom and being discharged into the boiler through corresponding headers at the top. Boiler plant efficiencies of 92% have been obtained on short tests and 90% for continuous performance.

E. J. T.

The internal combustion boiler. O. BRUNLER. *Chem. Age*, **12** [296], 150-2 (1925).—A discussion of a paper presented on a boiler in which the flame is burned in the water of the boiler. Oil and air are fed in proper proportions into the boiler below the water level and combustion takes place with the flame in direct contact with the water. Unusual efficiencies are claimed. The system is also applicable to evaporating plants.

E. J. T.

The kaolin deposits of Furtei, Sardinia. Quality and analysis of china clay deposits. ANON. *Chem. Age*, **11** [275], 15-6(1924).—The Furtei pits were opened in 1917 and prior to the British industrial crisis their production was 10,000 metric tons. Analyses show the kaolin from the various pits is practically free from alkali, lime and magnesia. Iron oxide in the form of ferric oxide in the calcined clay is never more than 1.85%, silica 57 to 68%; alumina 30 to 43%. The loss at red heat is 5 to 7.5%. E. J. T.

PATENT

Diatomaceous earth product. R. CALVERT, K. L. DERN and G. A. ALLES. Can. 245,938, Jan. 6, 1925. Diatomaceous earth is mixed with a halide of an alkali-forming metal to lower the sintering point of the clay present, and the mixt. is calcined. Cf. C. A., **18**, 2949.

(C. A.)

BOOK REVIEW

Testing of Fire Clay Brick with Special Reference to Their Use in Coal-Fired Boiler Settings. By R. F. GELLER. 1925. 42 pp. Technologic Paper No. 279 (Part of Volume 19) of the Department of Commerce, Bureau of Standards, Washington, D. C.

As the result of a conference, held at the Bureau of Standards, at which Government representatives and users and producers of fire clay refractories were present, 42 commercial brands of representative domestic refractories were obtained for labora-

tory testing through the coöperation of Stone and Webster. A field survey report was also obtained through the coöperation of this firm.

Only the so-called first quality fire brick suitable for use in coal-fired boiler settings were tested. The laboratory tests consisted of an endurance test, a reheating test, a quenching test, a load test, a softening point determination and an analysis of the brick both chemical and petrographic. The data contained in the field survey report cover the boiler rating type and load factor the year refractories were purchased and number purchased annually, the actual life and nature of failure of the refractory in the various locations of the boiler setting, the kind and quality of fuel used, the fusion point of the ash, and the type of stoker.

The refractory specimens were supplied by 60 power plants representing all of the important industrial districts of the country. A list of the plants is given together with the brand of specimen submitted by each.

The laboratory tests are briefly described as follows:

1. Endurance Test. This was made in two ways:

- (a) The brick were placed on end in a gas-fired furnace and subjected to a temperature of 1450°C for 72 hours, two bricks having been tested simultaneously.
- (b) The brick were laid flat, supported on a 7-inch span, loaded at the center with a 5-pound brick bat and subjected to a temperature of 1450°C for 72 hours. Two bricks of each brand were used in the test. This heat treatment was equivalent to the softening point of cone 19.

2. Reheating Test. This consisted of subjecting seven bricks of each brand to a temperature of 1400°C for 5 hours. This heat treatment was equivalent to the softening point of cone 15.

3. Quenching Test. This test followed in principle the tentative A.S.T.M. method, serial designation C38-21T, and was conducted on brick which had been reheated at 1400°C for 5 hours. Three kiln temperatures were used, *viz.*, 850, 1100 and 1350°C and five bricks from each brand were quenched from each temperature.

4. Softening Point Test. This was carried out according to the A.S.T.M. standard method, serial designation C24-20.

5. Load Test. This was carried out according to the A.S.T.M. standard method serial designation C16-20. This test was also given the following variations: (a) The brick were held under load at 1350°C for 10 hours instead of $1\frac{1}{2}$ hours, (b) brick preheated at 1400°C for 5 hours were held under load at 1350°C for $1\frac{1}{2}$ hours, (c) brick preheated at 1400°C for 5 hours were held under load at 1450°C for $1\frac{1}{2}$ hours.

6. Supplementary Tests.

- (a) Absorption Determination.
- (b) Petrographic Examination (after various heat treatments).
- (c) Chemical Analysis. Iron oxide, alumina and silica determined.
- (d) Erosion Test. This was done by subjecting the brick to a temperature of 1450°C for $1\frac{1}{2}$ hours, during which time $1\frac{1}{2}$ pounds of finely ground slag was introduced into the path of a flame and caused to impinge on the specimens.

The kiln used in making the endurance, reheating and quenching tests was a gas-fired recuperative, semi-muffle type. The furnace used for softening-point determinations was of the carbon resistance type.

For temperatures not exceeding 1350°C platinum-platinum rhodium thermocouples were used for measuring the temperature. For higher temperatures, an optical pyrometer was used by sighting into the open end of a sillimanite tube.

The results of the laboratory work seem to justify the following conclusions:

1. While the results obtained from the endurance test are of interest, simpler and less costly methods might better replace it.
2. The constant-volume test, as a preliminary step to quenching, provides valuable absorption data which have a bearing on the resistance of the brick to spalling.
3. The quenching test using 850°C as the furnace temperature is a reliable means for judging comparative resistance to thermal shock.
4. The softening point is of primary importance because of the many failures due to fusion and erosion.
5. The load test justifies itself as a means for determining whether or not an aluminous refractory is sufficiently well fired to resist a heavy load when applied during the initial heating of the installation.
6. It was found possible to improve the value of the load test by preheating the specimens.
7. The tests favor brick made by the dry-press process.
8. The chemical composition serves as an indirect measure of the softening point and resistance to spalling.
9. Petrographic examination can generally be substituted for chemical analysis, especially if the softening point is known.
10. The erosion test is of value if it is continued for several hours and if the proper slag is used.

The results of the field survey were as follows:

1. Refractories in the suspended arch fail principally through spalling.
2. In every location in the setting the failures are due mainly to erosion.
3. Conditions in the side and bridge walls were found to be very similar.
4. Walls which had lasted two years or longer showed high resistance to spalling.
5. The abnormal number of failures were found in connection with the use of the chain grate. This may be due to higher efficiency with the resulting higher temperatures.

There was found to be no apparent relation between laboratory and service results, since no two brands were subjected to the same service conditions.

PERRY D. HELSER

CERAMIC ABSTRACTS

Compiled by the

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¹The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from *Chemical Abstracts* by cooperative agreement.

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Abrasives

Corundum fields of S. Africa. ANON. *J. Soc. Chem. Ind.*, **44**, 384(1925).—Extensive corundum fields in N. and E. Transvaal cover an area of 2000 sq. miles, and additional occurrences are being located. During the war a keen demand for abrasives stimulated local production. It is estd. that an output of several hundred tons per month of first-grade crystal corundum could be maintained for a period of years.

H. H. S.

PATENT

Abrasive article. MINER L. HARTMANN. U. S. 1,538,111, May 19, 1925. An abrasive article consisting of abrasive grains united by alumina cement composed substantially of mono-calcic aluminate.

Cement, Lime and Plaster

Factors affecting brick masonry strength. S. H. INGBERG. *Proc. A. S. T. M.*, **24**, Part II(1924).—The properties of five kinds of building brick are discussed with reference to the resulting strength of the masonry. These tests were made on wall sections capped with gypsum, or Portland cement and gypsum. 1,000,000 lb. hydraulic testing machs. were employed. Vertical cracks in the brick were taken to indicate the first sign of failure. In no case were well defined planes of shearing formed. The results brought out that there is a general increase in strength of masonry with individual strength of brick. The degree with which the bond with the mortar is effected is an important factor. Brick with rough surfaces develop higher relative strength than smooth hard surface brick. As the cement content of the mortar increases there is a consistent gain in strength. Hollow brick wall sections laid with brick on edge developed on the average approx. 80% of the strength of solid walls of comparable thickness.

H. G. F.

Disintegration of Portland cement in sulphate waters. T. THORVALDSON, R. H. HARRIS, AND D. WOLOCHOW. *Ind. Eng. Chem.*, **17**, 467-70(1925).—Solns. of Na_2SO_4 , MgSO_4 , and their mixts. were shaken with set Port. cement and analyzed. Extractions by 1.64% Na_2SO_4 removed 84% of the CaO present and the limit had not been reached. The later extractions contd. Al_2O_3 and SiO_2 . The presence of CaCl_2 in soln. inhibits slightly the liberation of free CaO, whereas NaCl slightly accelerates it. Crystallization with increase in vol. is not taken into account in the disruption of concrete. The expts. indicate that complete disintegration of Port. cement may take place without crystn. playing any part except under certain conditions of alternate wetting and drying to accelerate the disruption of the already weakened structure. The difference in appearance of mortars and concrete disintegrated by various sulphate solns. is noted. With Na_2SO_4 the product is soft like putty; with MgSO_4 it is hard and granular; with mixts. the Mg is in control.

H. H. S.

X-ray researches on the dehydration products of gypsum. H. JUNG. *Z. anorg. Chem.*, **142**, 73-9(1925); *J. Soc. Chem. Ind.*, **44B**, 284(1925).—The lattice structure of $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ is not altered by the gradual loss of water up to 200°; above this temp.

the anhydrite structure is formed. Stucco plaster (6.94% H_2O) consists almost exclusively of the hemi-hydrate.

H. H. S.

Quantities of materials for concrete. DUFF A. ABRAMS AND STANTON WALKER. *Bull. 9*, Structural Materials Research Lab.—A second edition of *Bull. 9* of the Structural Materials Research Laboratory, Lewis Institute, Chicago, "Quantities of Materials for Concrete," by Duff A. Abrams and Stanton Walker, has been issued. The principal subject-matter of the *Bulletin* is a series of tables of proportions and quantities for Portland cement concrete for compressive strengths of 2000, 2500, 3000, 3500 and 4000 lb. per sq. in. at 28 days, using fine and coarse aggregates of different sizes, and concrete of a wide range of workability as measured by the slump test. The tables are based on the water-ratio method of proportioning concrete developed in this Laboratory as a result of many thousands of tests. They differ principally from tables by other authors in that the proportions have been selected with definite strengths in view, and take into account the quantity of mixing water as well as the size and grading of the fine and coarse aggregates. This *Bulletin* was first published in 1921, but had been out of print for several months. In the second edition, the text has been rewritten to constitute a more complete discussion of the subject. A method of taking into account the differences in volumes of materials when measured in the Laboratory and when measured under field conditions is described. The descriptions of field and laboratory test methods have been enlarged and include recent changes in the Standards of the American Society for Testing Materials.

Ed.

Iron cements. P. MARTELL. *Chem.-Ztg.*, **49**, 157-8(1925).—With increased prices for Fe products repairs are now called for that would not have been attempted when Fe was cheap. For this type of work and for emergency repairs practical receipts for prepg. and using some 30 Fe cements are offered. The one of most general application consists of 85 pts. Fe filings, 10 pts. S flowers and 5 pts. NH_4Cl , moistened with H_2O before use.

(C. A.)

PATENTS

Process of making iron and cement. EDWIN C. ECKEL. U. S. 1,536,381, May 5, 1925. The process of producing iron and alumina cement, comprising fusing a mixt. of iron bearing ore low in silica and calcareous mats. in such proportions that the resulting slag will contain a relatively high proportion of alumina and less than 15% of silica, separating the reduced metallic iron and the slag, and cooling and grinding the latter.

Process of making iron and cement. EDWIN C. ECKEL. U. S. 1,536,382, May 5, 1925. The method making cement and iron, comprising charging into a fur. calcareous, aluminous and ferruginous mats. in such proportions as to constitute a charge containing after loss of its volatile constituents, not less than 25 nor more than 55% of lime, or of lime and magnesia together, not less than 25 nor more than 50% of alumina, nor more than 10% of silica, and not less than 10% of iron oxide, fusing such a charge to the point of complete melting of all its constituent raw mats., in a blast or electric fur., allowing sufficient time for separation of the reduced metallic iron and the lighter cement-forming compounds, tapping off the iron and the cement-melt separately, and grinding the latter to powder.

Enamels

Full muffle versus the newer types of muffle furnaces. E. B. PRENTICE. *Fuels and Fur.*, **2**, 20(1925).—Explains attempts of builders to improve the old muffle types of enameling kilns so as to compete with later models in which the gases are muffled instead of the ware.

R. D. L.

Cleaning iron and steel for enameling. C. W. MEHLING. *Fuels and Fur.*, **3**, 132 (1925).—A rapid process for cleaning sheet iron and steel for jappanning and enameling

consists in dipping in a Monel metal basket into 3 solns. First a boiling Wyandotte soln. for 15 min., then acid for 10 min. and finally a boiling soln. of sal-soda, for a few mins., rinsing in warm water between each soln. Strength of first soln. is 6 oz. of Wyandotte per gal. of water, second, 2 parts water to 1 part muriatic acid and third, 100 lbs. sal-soda to 1000 gals. of water. Two men can clean about 24,000 sq. ft. of surface per 9 hr. day and the cost is \$.008 per sq. ft. including overhead.

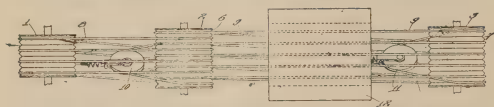
R. D. L.

Heat interchanger used in drying enamel frit. ANON. *Fuels and Fur.*, 3, 153 (1925).—Description of installation by Drying Systems, Inc., for utilizing waste ht. from smelter for drying frit. Capacity is 750 lbs. in 45 min.

R. D. L.

PATENTS

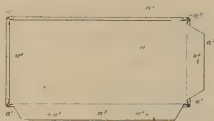
Apparatus for enameling articles. ELIOT O'HARA. U. S. 1,535,850, April 28, 1925. App. for enameling articles having a conveyor for supporting the articles while receiving the coating of enamel, a second conveyor onto which the coated articles are



transferred automatically from the said first conveyor and a fur. through which the articles are carried by the second conveyor, each conveyor having a plurality of

parallel runs, the adjacent ends of the runs of the two conveyors lapping past each other for some distance in such manner that the lapping portions of each run of each conveyor will be intermediate two runs of the other conveyor.

Vitreous enameled tile, brick, and the like. JAMES HENRY EDWARD FRANCIS. U. S. 1,535,301, April 28, 1925. A vitreous enameled tile, brick or the like formed from a metal plate having inwardly curved edges, characterized in that said edges throughout their length are each inwardly turned through an angle greater than 90° without joint, as set forth.



Glass

The "Basic Glass" industry. A. BIGOT. *Le Verr.*, 5, 4-6(1925).—Synthetic basic glasses in the vitreous state are colloidal in nature. They are in an unstable condition and are sensitive to variations in temp. and to impact. Crystallization gives them a definite state and determines their resist. to phys. forces which constitute their principal property. The mech. resist. depends upon the nature of the crystals formed. The principal methods of studying them apart from chem. anal. are by the microscope, meas. of shrinkage, resist. to wear and resist. to crushing, etc. The formation of crystals is accompanied by a shrinkage which is measured on rods of the glass. The rods are heated successively for an hour to temps. from 800° to 1050°C , in 50° intervals, and cooled after each heat treatment when the change in length is measured. After prolonged htg. at 1000° the max. shrinkage is obtained. Above 1050° the rods lengthen, swelling slightly and thereby lose some of their mech. strength. They are then in the vicinity of their softening temp. Crystallization of a basic glass causes the crushing strength to increase. Vitreous test pieces broke at 1420 kg. per sq. cm. whereas similar specimens reheated to effect crystallization broke at 2400 kg. The type of crystals and their formation have an influence upon their mech. properties. A basic glass obtained from slag from copper smelting has crystals of the peridot class. A glass obtained from cinders and clinker contain babingtonite. Microphotographs of several thin sections are given. In comparison with other materials the basic glasses have greater resist. to wear measured by a Dorry machine—basic glass 0.8–1.1 mm., granite 1.85 mm., natural (paving) stone 2.05 mm., natural basalt 2.66 mm., stoneware tile 1.55 mm. The resist. to shock and to bending depends upon the state of crystn. and is higher for basic

glass than for ceram. tile of similar dimensions, the basic glass breaking at 1040 kg. and the ceram. products at 463 and 481 kg. The basic glasses are poor conductors of electricity, although some contain sufficient iron to be attracted to a magnet. Their resist. to puncture is lower than that of porcelain and it seems to diminish as the proportions of bases increase, the state of crystn. having little influence on the elec. resist. The basic glasses cannot be used as insulators for voltages greater than 100,000 volts. It is shown from (French) mfg. costs that paving blocks made from cinders and clinker cost less than the common paving blocks made from ceram. mats. or natural stone.

L. N.

Fused quartz. R. PAGET. *Nature*, **113**, 748-52(1924).—Review contg. a considerable amt. of phys. data.

W. M. C.

Absorbed gas layers on glass surfaces. A preliminary measurement of a primary gas grown skin. J. J. MAULEY. *Proc. Phys. Soc. London*, **36**, 288-90(1924).—A nude glass surface, when first exposed to a gas acquires by adsorption a layer of gas (primary skin). This layer adheres to the glass under ordinary conditions even in high vacua. This layer adsorbs more gas which may be removed by high vacua. M., by studying the amt. of air removed from a highly evacuated glass container which was subjected to a glow discharge, calculates the thickness of this primary skin as 20 molecules. This is considerably more than the value given by other investigators.

W. M. C.

The use of alumina in glass. D. J. McSWINEY. *Glass Indus.*, **6**, 69-72(1925).—Addition of Al_2O_3 to a high lime batch increases the melting rate and in a low lime batch decreases it, but the effect is not great below 3%. Al_2O_3 similarly increases chem. resist. of low lime glass and decreases resist. of high lime glass. It is valuable in tube glass for reducing tendency to devitrification upon repeated heating. Alumina glass has a wider working range and lower min. working temp. than the straight lime glass. Clay is the cheapest source of Al_2O_3 .

D. E. S.

Raw materials of the glass industry. J. B. KRAK. *Glass Indus.*, **6**, 73-6(1925).—This article discusses sand used in glass making.

D. E. S.

Note on some properties of a sandstone block, after use in a glass furnace. H. S. HOULDSWORTH. *Jour. Soc. Glass Tech.*, **9** [33], 3(1925).—A detn. of the depression of the fusion temp. of refrac. mats. when mixed with the same propn. of the same glass indicates their relative resist. to the solvent action of the glass. To this end the refrac. mat. and the glass were ground separately until they passed a 100-mesh screen, and were then thoroughly mixed in the desired proportions. Cones were made and were heated with standard cones until fusion took place. Powdered Penshaw stone has a somewhat greater resist. to chem. attack by a soda-lime glass than has a good fire clay brick after powdering. Penshaw stone retains a close, compact structure when used in a glass fur. This tends to hinder the penetration of glass into the stone, so adding to the life of the refrac. mat., and aiding its successful use in fur. construction. A detn. of the depression of the cone fusion temp. of the powdered refrac. mat. when mixed with powdered glass, taken in conjunction with the change in porosity after being fired, furnishes a satisfactory guide to the resistance to corrosion of the refrac. articles examined when used in a glass fur. Penshaw stone as quarried showed an after expansion of 1.4% after heating for 2 hrs. at cone 9 and 1.3% after being fired at cone 14. The reversible thermal expansion of the stone after use in a glass fur. was not very different from that of a fire clay brick.

J. G. P.

The early glass houses of Bristol. FRANCIS BUCKLEY. *Jour. Soc. Glass Tech.*, **9** [33], 36(1925).—During the 18th century Bristol was considered an important glass making center. A history of glass making in and about Bristol is given, which includes an account of the glass masters of this time, and the various histories of the important glass houses of this time.

J. G. P.

Some recent developments in furnaces for glass works. J. S. ATKINSON. *Jour. Soc. Glass Tech.*, 9 [33], 72(1925).—A new design of pot furnace is shown in Fig. 1.

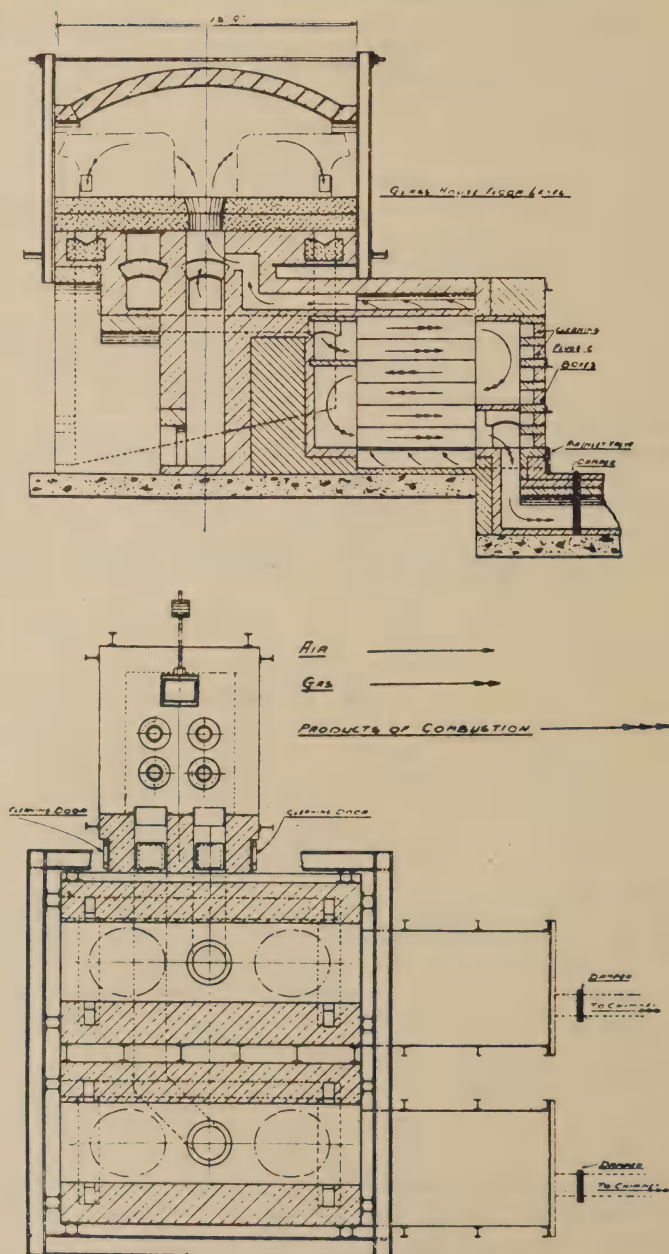


FIG. 1.—Patent Stein Glass Pot Furnace (Unit Type).

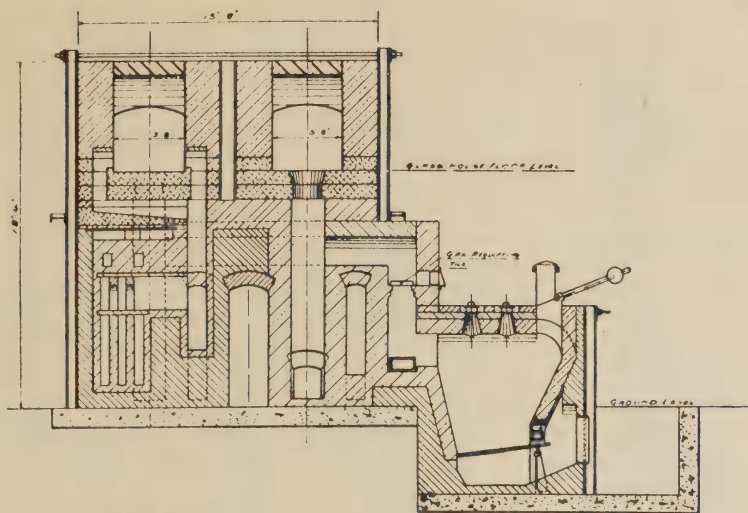


FIG. 1a.—Patent stein glass pot furnace (unit type).

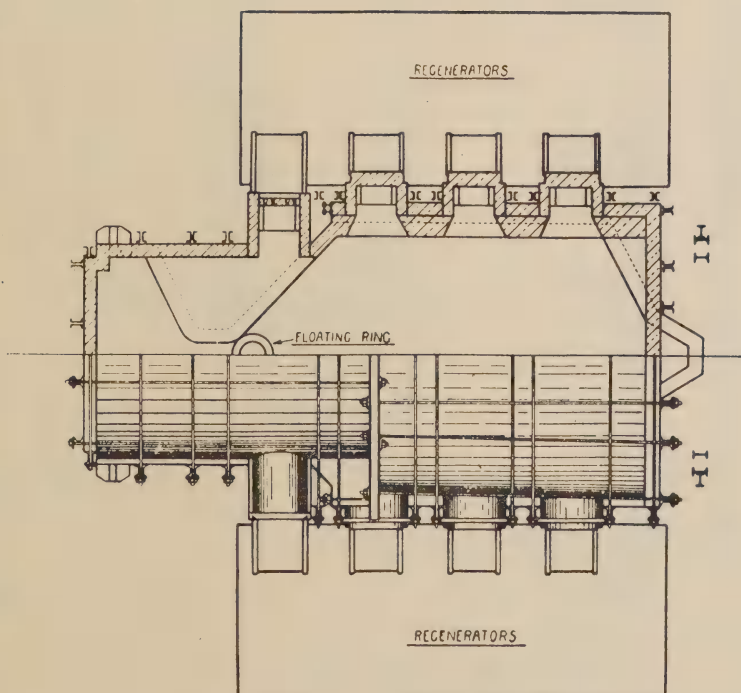


FIG. 2.—Patent "Torpedo" glass tank furnace.

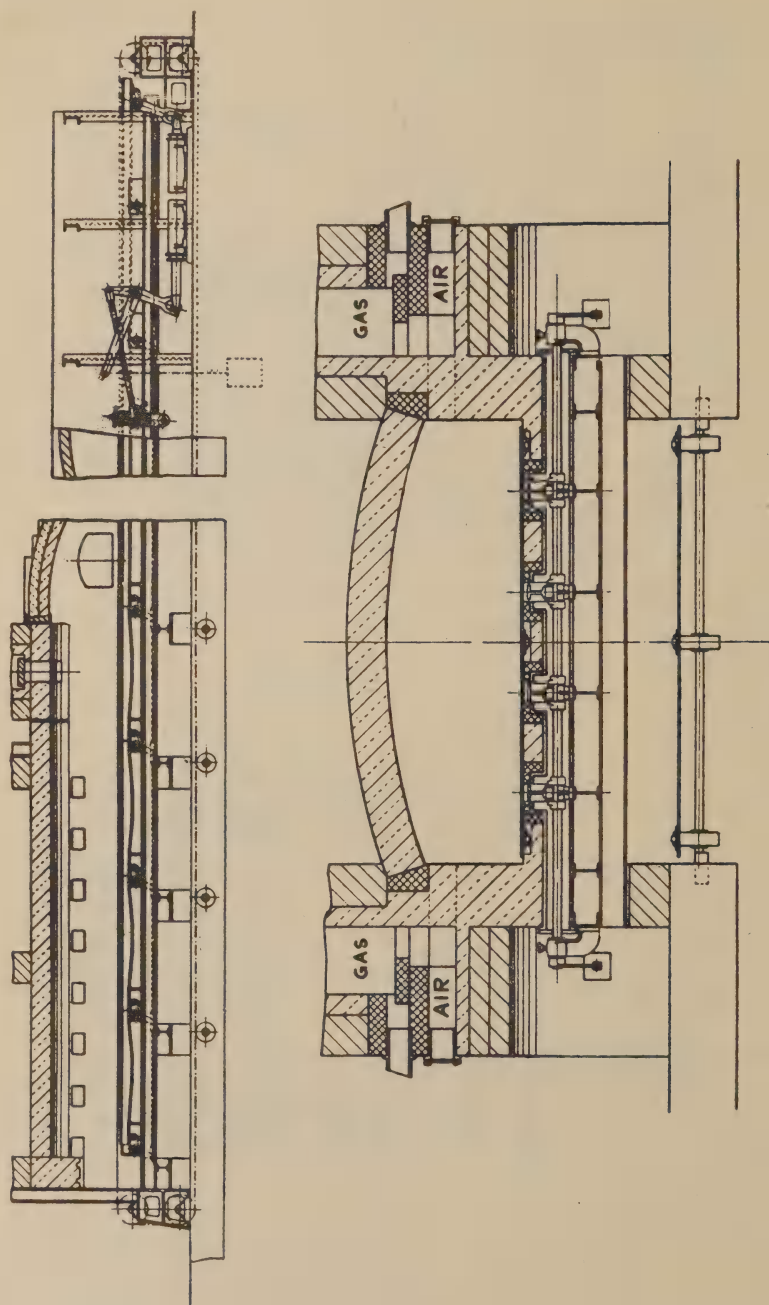


FIG. 3.—Step by step leer.

The general design follows closely the design of the "Stein" standard pot furnace. A design of tank furnace which was developed at the Charlton works of the United Glass Bottle Co., by T. C. MOORSHEAD is shown in Fig. 2. Instead of the rectangular melting and refining chambers as built with the ordinary design of tank fur., the corners of these chambers are eliminated, giving a stream line effect. Fig. 3 shows the construction of a continuous leer now being installed in the north of England. J. G. P.

A note on new ideas for tank furnace design. T. TEISEN. *Jour. Soc. Glass Tech.*, 9 [33], 36(1925).—A comparison of the dimensions in modern open-hearth steel furnaces and glass tanks is made. The standard type of glass tank, namely, that of the cross flame regenerative furnace with a melting and working end, separated by a fixed bridge and heated by the flames emerging from three, four or more ports on either side of the melting end. It is pointed out that to improve the life of the furnace, the burners should not be directed on the side walls. Suggestions for improving the bridge design are given. J. G. P.

Glass tank design. JAMES A. VOORHIES. *Fuels and Fur.*, 3, 167(1925).—An article explaining design of combustion chambers, calculations of dimensions for ports and illusd. with definite figures as to temps. and gas requirements. R. D. L.

Glass tank design. JAMES A. VOORHIES. *Fuels and Fur.*, 3, 487-91(1925).—In a previous article author has description of design of combustion chambers and ports. This article gives data for design of regenerators, flues and stacks illus. with typical figures. R. D. L.

Developments in the glass industry. BJARNE SCHIELDROP. *Fuels and Fur.*, 3, 41(1925).—A symposium of new patents on the glass making indus. indicates that the greatest progress is shown in the plate glass indus. and also that the forming dept. is receiving much attention, but that the melting dept. is not receiving the consideration it should. Ratio is as 60:13. R. D. L.

The action of caustic soda on Jena glass. E. CAROZZI. *Giorn. Chim. Ind. ed appl.*, 7, 129(1925).—Caustic soda dissolves out ZnO from the glass. When 50 cc. of 20% NaOH were placed in a 300-cc. beaker for one hour 0.0458 gr. of ZnO were removed from the glass. The method of analyzing is given and a table showing the amount of SiO₂, Al₂O₃ and ZnO dissolved out by 10 N, 2.5 N, N and 0.1 N solns. of NaOH when treated with heat and also by standing with the soln. in the container for some length of time. S. S. C.

Brittle and elastic glasses. F. JOCHMANN. *Sprech.*, 58, 265-6(1925). H. G. S.

Corrosion of glass surfaces. G. W. MOREY. *Ind. and Eng. Chem.*, 17, 389-92 (1925).—The mechanism of the corrosion of glass by water is complex, involving in its initial stages a probable miscibility of glass, regarded as an undercooled liquid, with water, and in its later stages the decompn. of the silicates. At ordinary temps. these processes require a long time, but at higher temps. they can be followed in their various stages to the end. In interpreting results it is necessary to bear in mind that the term "solubility" has no meaning in connection with such complex processes; the tests merely afford a measure of the rate of reaction, and great care should be taken to specify the conditions of expts. The order of resistance to corrosion of the component oxides of glass is: MgO, CaO, BaO, PbO, K₂O, Na₂O, but complex glasses are superior to simpler ones, e. g., the ratio 7 of K₂O to 3 of Na₂O is superior to K₂O or Na₂O singly. The addn. of a small quantity of ZnO or Al₂O₃ is distinctly favorable, while B₂O₃ is a constituent of most of the best glasses. H. H. S.

Selective absorption of colored glasses, and a radio-metric method of determining their reflecting power. M. KAHANOWICZ AND A. ESTRAFALACES. *Compt. rend.*, 179, 890-3(1924); *J. Soc. Chem. Ind.*, 44B, 243(1925).—The expression $E = (R\delta\lambda/d) \cdot E_0$ determines the reflecting power, R, of colored glass. E_0 is the energy of total radiation,

E that transmitted; S is based on the emission from the source with regard to the spectral zone λ ; and $R\delta\Delta\lambda/d$ expresses the monochromatic action of the filter, δ being the density of the glass, d its thickness in mm., and $\Delta\lambda$ the spectrum band, in microns, transmitted.

H. H. S.

Surface tension of molten glass. A. LECRENIER AND P. GILARD. *Bull. Soc. Chim. Belg.*, **34**, 27-34(1925); *J. Soc. Chem. Ind.*, **44B**, 242(1925).—Surface tension in soda-glass is increased by increase of CaO and when CaO is replaced by Al_2O_3 , BaO or MgO; and decreased by decrease of SiO_2 , by increase of Na_2O , by replacement of Na_2O by K_2O , and by addn. of Na_2SO_4 or boric acid.

H. H. S.

Chemical and thermal resistance of laboratory glasses. A. MAURI. *Atti Congr. Naz. Chim. Ind.*, 330-9(1924); *J. Soc. Chem. Ind.*, **44B**, 243(1925).—The results are given of chem., mechanical, and thermal tests on lab. ware composed of Jena, old and 1920, French Labo, Belgian Boromica, Amer. Pyrex, and Italian Murano 1922 and 1923, glasses.

H. H. S.

Physico-chemical composition of glasses. P. BARY. *Rev. gén. Colloid*, **3**, 1-8, 43-52(1925); *J. Soc. Chem. Ind.*, **44B**, 242(1925).—Silicates of the alkali metals form condensation products of the type $Na_2O-(SiO_2)_n-ONa_2$, while those of the bivalent metals (Ca, Mg, Pb, Fe, Zn, Ba) not only condense but in addition form complex polymerides of the type $(CaO = (SiO_2)_n = CaO)m$. Glass at ordinary temp. consists of a soln. of the crystalloidal alk. silicate in the polymerized polysilicate of the bivalent metal. The large size of the polysilicate mols. accounts for the rigidity of the glass, and also for the decrease of this property by heating, whereby the mols. become depolymerized. Plasticity, which occurs above a certain temp., is due to the plasticizing effect of the dissolved alk. silicate on the colloid.

H. H. S.

BOOK

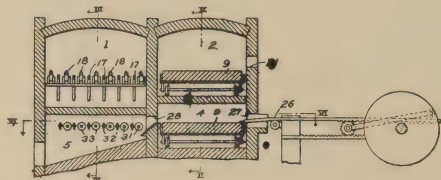
Theorie der Glasschmelzkunst als physikalisch-chemische Technik. Vol. II. Theorie u. Praxis. EBERHARD ZSCHIMMER. Einteilung d. Flasgebiets. Die Quarzgruppe. Die Spiegelgruppe. Jena: Thüringer Verlagsanstalt u. Druckerei. 208 pp. (C. A.)

PATENTS

Refining glass. L. S. VELLO. Brit. Pat. 211,879, May, 1923. No. 4496/24.—An app. is described for fusing glass in vacuum for removing occluded gases. The glass is suitable for sealing electric lamp bulbs by the process of applying a ring of fusible glass, as described in Specif. 197,693.

W. M. C.

Window-glass apparatus. JAMES G. CLEVELAND AND HARVEY L. KELLER. U. S. 1,535,717, April 28, 1925. In window glass flattening app. the combination of an intake



chamber being arranged vertically one above the other.

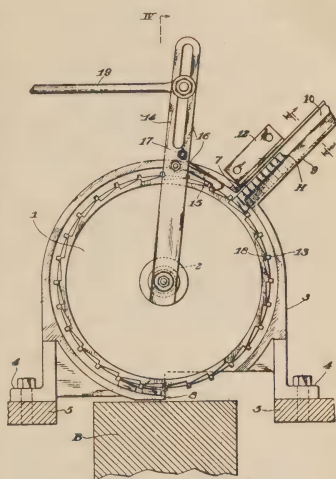
Absorption glass and method of making it. JOSEPH CARL PARKINSON. U. S. 1,536,919, May 5, 1925. The method of producing glass of high ultra-violet ray absorbing properties which consists in fusing a substantially pure cerium compound in a reducing bath.

Apparatus for feeding glass blanks. WILLIAM OWEN. U. S. 1,536,918, May 5, 1925. In combination with a tunnel heating chamber and a carrier mounted for move-

ment through the chamber, a wheel mounted for rotation transversely of the carrier thereabove and provided around its periphery with projecting spaced feeding members, an inclined blank carrying chute leading to the periphery of the wheel and adapted to feed the blanks therein against the periphery of the wheel, a retaining flange extending around the wheel outward of the blanks to a point above the carrier and means for giving the wheel an intermittent step by step movement.

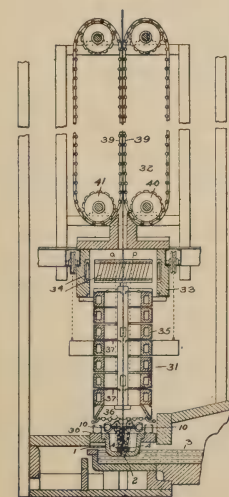
Glass and batch therefor. JOSEPH CARL PARKINSON. U. S. 1,536,920, May 5, 1925. A glass for absorbing ultra-violet rays containing cadmium, such glass having a yellow tint, and being substantially free from coloring matter other than the cadmium.

Glass leer. MARSHALL W. GLEASON AND CLARENCE G. MILLER. U. S. 1,537,027, May 5,



1925. A removable attachment to leers, composed of a body forming a chamber, one end of which is adapted to connect with the mouth of a leer, means of closing the free end of said chamber and of interlocking pans adapted for transitory passage through said chamber.

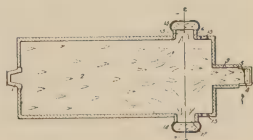
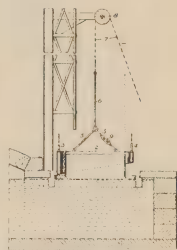
Cooling hollow glass articles during drawing. HENRY F. CLARK. U. S. 1,537,462, May 12, 1925. In the method of drawing glass cylinders from a molten bath of glass, the steps consisting in cooling the glass, and adjusting the cooling effect around the cylinder by adjusting the position of the cooler relative to the cylinder being drawn, substantially as described.



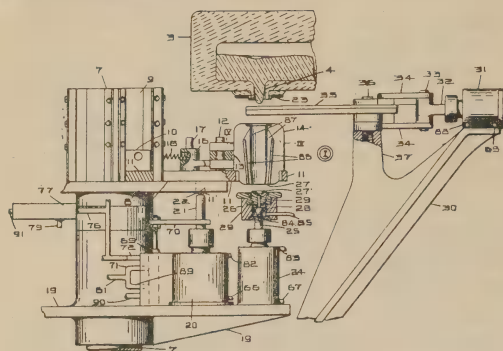
Process and apparatus for forming sheet glass. HALBERT K. HITCHCOCK.

U. S. 1,538,327, May 19, 1925. The process of forming sheet glass from a bath of molten glass which consists in extruding the glass through a hot slot and thereby imparting to it a shape similar to the finished sheet, subjecting said sheet immediately adjacent the slot to parallel traveling pressure on its opposite faces and for substantially its entire width and thereby imparting more accurate dimensions thereto, artificially cooling said traveling press. means, and pulling the sheet from said traveling press. means.

Glass furnace. JAMES P. WEAVER. U. S. 1,538,229, May 19, 1925. The process of supplying molten glass to a glass-working machine, consisting in melting the glass, flowing the molten glass through a tank to the machine, and at an inter-

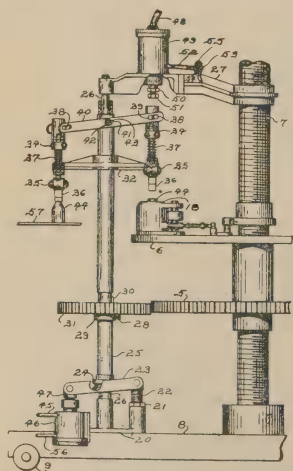


mediate point along the side of the flowing stream allowing a portion of the surface glass to flow out and form cullet.



sealing position at said outlet and then downward, and a shear operable relatively to the means for severing the molten glass from said means.

Plunger gathering of glass. FRANK O'NEILL. U. S. 1,537,962, May 19, 1925. A glass feeder plunger drive embodying a rock shaft having two pinions, a piston and cylinder actuator for one of the pinions, and a plunger stem driven from the other pinion.



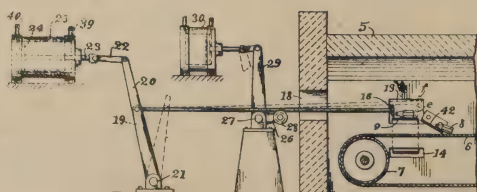
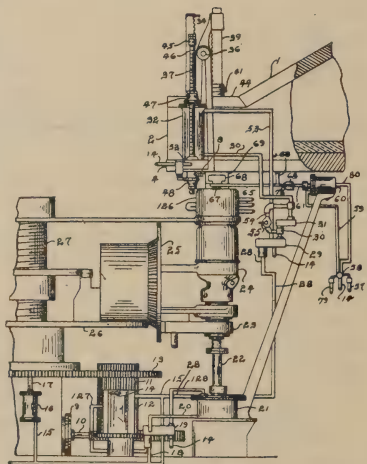
Take-off mechanism. FRANK O'NEILL. U. S. 1,537,963, May 19, 1925. A machine embodying a table, a sectional mold carried by the table, an intermittent drive for rotating the table to a position of rest for the mold, mold opening means, a take-off embodying ware gripping means, a first gear rotatable with the table, a second gear in mesh with the first gear drive for bringing the gripping means to said mold position of rest, actuator mechanism for lowering the gripping means towards the opening mold, additional means

coacting to effect gripping of the ware by the gripping means, and control means for reversing the actuator mechanism to lift the gripped ware, said connections coacting to shift the gripping means and ware held thereby away from said additional means.

Means for transferring ware to leers. RICHARD LA FRANCE. U. S. 1,538,248, May 19, 1925. The com-

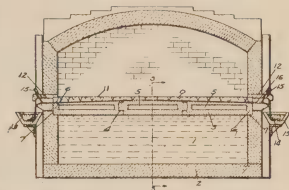
Glass-feeding apparatus.

FRANK O'NEILL. U. S. 1,537,961, May 19, 1925. A glass tank having a pool of molten glass, said tank having a projecting portion into which the pool extends, said portion being provided with a bottom outlet, relatively movable sectional suction means for withdrawing glass from the pool through the outlet, said means being movable laterally to a position adjacent said outlet, and then directly toward said outlet into



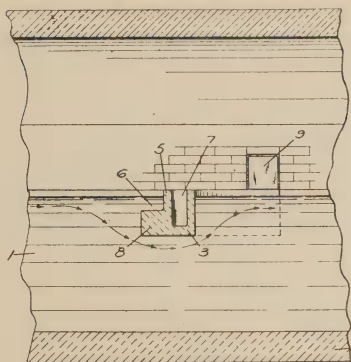
bination of a horizontally traveling conveyor, a pusher extending lengthwise thereof, a motor having connections with said pusher and operable to move it back and forth over the conveyor, a second motor, connections between said second motor and the pusher for lifting and lowering the pusher, and controlling mechanism operable to effect periodic operations of the motors in a predetermined time relation.

Glass furnace. JOSEPH A. REECE. U. S. 1,538,215, May 19, 1925. A refractory floater for use in a glass tank, comprising a main glass obstructing portion, and a glass collecting trough in the top of the floater, one side wall of the trough being normally slightly below the glass level so that surface glass may flow into the trough.



Floater for glass furnaces. HARRY S. CONKLIN.

U. S. 1,538,169, May 19, 1925. A refrac. floater for use in a glass tank, the floater having a glass retaining ledge along one side below the glass level.



Heavy Clay Products

First time on any brick plant. ANON. *Brick & Clay Rec.*, **66** [6], 428-30(1925).—The article describes and illustrates the unusual equipment recently installed at the plant of the Bradford Brick & Tile Co., for handling green and fired brick.

P. D. H.

Operating five plants in one group. ANON.

Brick & Clay Rec., **66** [6], 434-6 (1925).—The article describes and illustrates the five plants

of the Denver Sewer Pipe & Clay Co. Plant No. 1 manufactures sewer pipe; plant No. 2, common brick; plant No. 3, fire brick and special shapes; plant No. 4, hollow block; and plant No. 5, face brick. All kilns have an inside diameter of 30 ft., and are of the round down-draft type. The forced draft system of firing is used on all plants with the exception of the sewer pipe plant which finds oil burning very satisfactory. A central power station is maintained and all of the plants are operated electrically.

P. D. H.

Brickmaking and use of brick in Sweden. G. WSON CRONQUIST. *The Clay Worker*, **83** [5], 436-8(1925).—The article is continued in *The Clay Worker*, **83**, 6. The description of the method of manuf. is divided into 2 parts, viz., making ordinary stock brick, red face brick and roofing tile from the glacial surface clay (with or without chalk); and making fire brick, vitrified brick, sewer pipe and proof brick from fireproof and half fireproof shale. Due to the severe climatic conditions the average Swedish brick yard cannot be operated longer than 120 to 150 days during the year. The clay is dug mostly by conveying digging machines of the "pater noster type." The clay is hauled in side dump cars ($1\frac{1}{2}$ to 2 cu. yds. capacity) drawn by a wire cable around a circuit. With this digging and hauling system 2 men do the work of 10 or 12. The clay is dumped directly into a mixing feeder composed of a conical trough sloping upward in which a shaft with mixing knives mixes the clay and feeds it out the upper end. Very often the clay contains pebbles and must be put through rolls, the 2 most common types of which are those of Svedala and F. L. Smidth. The clay is used quite soft and the die is water lubricated. The size of the brick in South Sweden is $10'' \times 5'' \times 2\frac{1}{2}''$ but in middle and North Sweden the size is $12'' \times 6'' \times 3''$. The auger mach. capacity ranges from 20,000 to 40,000 brick per 10 hrs. The brick are hand cut (2 or 3 at a time). The green brick

are transported to the drier on wheelbarrows or on cars, whereas roofing tile are carried on special cars with pneumatic cycle wheels or on chain conveyors. The drier is usually located on 2 or 3 floors directly above the kiln for utilizing waste heat. From 10 to 20 days are required for the brick to dry. The glacial clays are very difficult to dry due to excessive shrinkage.

P. D. H.

Brick buildings. K. DÜMLER. *Deut. Töp. Zieg. Ztg.*, **56**, 226-8(1925).—Brick buildings in northern Germany and Denmark are described.

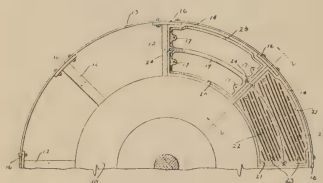
H. G. S.

Good roofing tile. ANON. *Deut. Töp. Zieg. Ztg.*, **56**, 278-81(1925).—It is claimed that good roofing tile must have a low porosity.

H. G. S.

PATENTS

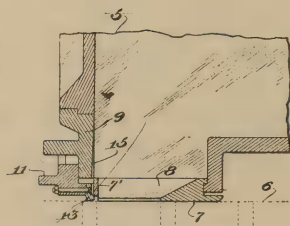
Screen plate for clay machines. FRANK C. CARNAHAN. U. S. 1,535,290, April 28, 1925. In a clay working mach. the combination of a dry pan comprising a central portion, a plurality of radiating braces extending outwardly thereof, a plurality of arcuate



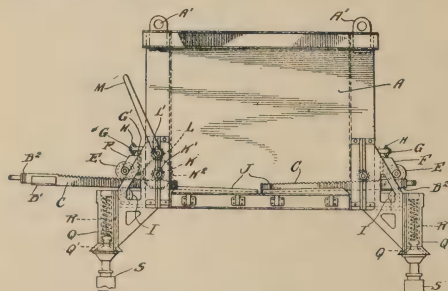
locking flanges transversely secured to the outer ends of said braces, a rim engaging the outer side of said flanges, means for securing said rim to said flanges, a screen plate frame adapted to be positioned between said rim and said central portion and seating at opposite ends on said braces, said frame having its opposite outer end portions offset to receive said flanges for locking the frame against circumferential

movement, a pair of screen plates adapted to seat in said frame, said plates having openings therethrough for sifting pulverized mat., means for holding the plates within the frame, and means for holding the frame to the braces.

Floating strike for brickmaking machines. IVAN C. FREY. U. S. 1,535,303, April 28, 1925. The combination with a press box from which clay is adapted to be expressed, of a strike-off strip secured to said box at one side thereof for up and down movement with respect thereto, and means for by-passing some of the clay in the box onto the said strip to force it downward.



Brick-stack lifter. PAUL A. MEEHAN. U. S. 1,535,430, April 28, 1925. A brick lifting device com-



prising in combination a hollow frame adapted to surround the bricks to be lifted, two sets of parallel rigid brick supporting fingers mounted in said frame at the opposite sides thereof and longitudinally movable toward and away from one another in straight lines into and out of the positions in which they jointly extend across said frame, and mechanism mounted in the frame for giving said fingers said movements.

Refractories

Do water-cooled furnace walls increase boiler efficiency? JULIAN HARVEY. *Power*, **61** [14], 542(1925).—The impression has been gained that the use of water-cooled walls increases the amt. of ht. absorbed by the boiler. H. is of the opinion that in properly constructed fur. walls heat is radiated inside the fur. and absorbed by the boiler heating surface. He is doubtful if additional water-htg. surface in the com-

bustion chamber necessarily improves the heat-absorbing capacity of the boiler as a whole.

C. J. H.

Modern methods of batch preparation in the fire brick industry. G. BENFEY. *Feuerfest*, **1**, 1 (3) 1925.—Improvements over the old established methods aim to replace man power by machines, and improve the quality of the batch by (1) more intimate mixing, (2) more uniform water content, and (3) elimination of harmful impurities. In contrast to the old open air weathering and pit mixing method the modern tendency is to dry and then grind the raw mats. A description is given of a typical installation built by the Georg Dorst Mach. Wks. Oberlind S-M for the Frieberg Porcelain Co. and used for the prepn. of sagger mixt. The plant is divided into three units: (1) crushing and separating of grog, (2) grinding of clay, and (3) mixing. The clay is ground on a dry pan and automatically screened and carried by bucket elevator to storage bins. Grog passes through a roll crusher, elevator and revolving screen which deposits the mat. into 3 bins graded according to fineness. The storage bins discharge their contents through special measg. devices onto a conveyor which carries the mat. to a horizontal mixer where water is added and from there to a horizontal pugmill.

F. A. W.

The softening of raw materials used in the refractory industry at high temps. H. HIRSCH. *Kerm. Rund.*, **33**, 279-84(1925).—The transverse resist. of refrac. clays to load at high temps. was studied. It was found that clays having a higher SiO_2 content than kaolinite and those having a lower content in certain cases are more resist. to load at high temps. than those clays having a ratio of SiO_2 and Al_2O_3 equal to that of kaolinite. The presence of Fe and alkalis in the clays were found to greatly reduce their resist. to load at high temps.

H. G. S.

Resistance of refractory materials to temperature changes. W. STEGER. *Stahl u. Eisen*, **45**, 249-59(1925); *J. Soc. Chem. Ind.*, **44B**, 284(1925).—Quenching expts. on bricks give the following relative values for sensibility to change of temp.; carborundum 2, bauxite 13, zirconia 16, fire clay 3-30, chromite 42, silica 75, magnesite 100. The coeff. of expansion was measured in 4 temp. ranges 15-300°, 300-500°, 500-600°, 600-750°. The sensitivity of silica brick at low temp. is caused by the α - β cristobalite transformation at 230°. If quartz is present, as in badly fired brick, the greatest expansion is in the third temp. range. Carborundum shows uniform expansion in all the temp. ranges.

H. H. S.

Graphite melting point. E. RISCHKEVITSCH. *Z. Elektrochem.*, **31**, 54-63(1925); *J. Soc. Chem. Ind.*, **44B**, 241(1925).—Carbon rods headed electrically in an atmosphere of argon melted at $3800^\circ \pm 100^\circ$ Abs. The arc temp. varied from 3450° Abs. at 0.005 atm. to 4330° Abs. at 1.5 atm.

H. H. S.

Refractories for use in regenerators. STUART M. PHELPS. *Fuels and Fur.*, **3**, 507-8(1925).—Report of invest. to det. effect of porosities on rate of ht. flow in clay refrac. when used as checker work in regenerators, in addn. to data on other types. Conclusion that most suitable clay refrac. for this purpose is a dense brick, especially if it is subjected to slagging action.

R. D. L.

The melting point and the vaporization of graphite. EUGEN RISCHKEVITSCH. *Z. Electrochem.*, **31**, 54-62(1925); cf. *C. A.* **18**, 3505.—A vapor-pressure curve for graphite between 3450° and 4330° Abs. has been added to previous work together with the heat of vaporization calcd. from the Clausius-Clapeyron equation (92 Cal./mole). This value is only approx.

(C. A.)

The melting and heat of vaporization of graphite. K. FAJANS. *Z. Elektrochem.* **31**, 63-70(1925); cf. preceding abstr.—The presence of 0.1% impurities in graphite has such a slight effect on its m. p. that the m. p. phenomena observed by R. on graphite with 0.1% ash content would also occur with pure graphite. Since at pressures above $1/3$ atm. the positive crater of the arc is covered with liquid C, temps. above that pressure

are b. p. of the liquid phase. Some of Lummer's observations on the melting of C in the arc are satisfactorily interpreted in terms of R.'s observations. The arc method (detn. of the temp.—dependent only on pressure of the positive crater) is shown to be superior to the measurement of the velocity of vaporization of C threads. From the measurements of Kohn and Guckel (*C. A.*, 18, 1421) on the heat of sublimation of C the heat of sublimation of diamond is $147 \text{ Cal.} \pm 1 \text{ Cal.}$ (*C. A.*)

PATENTS

Face-brick sanding machine. IVAN N. DOUGHTY. U. S. 1,535,402, April 28, 1925. App. for sanding brick comprising a pad of fibrous mat. engaging the brick and a sand reservoir feeding sand to the pad.

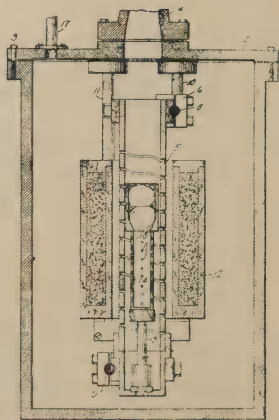
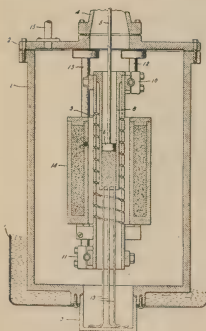
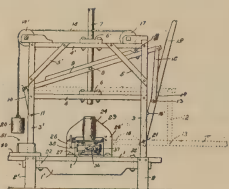
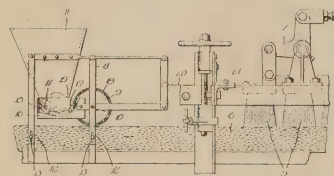
Refractory-shape press and mold therefor. ASHLEY J. GULICH. U. S. 1,535,410, April 28, 1925.

A molding app. comprising a stationary receptacle for containing plastic mat. and having its opposite ends freely open, a swinging trimmer provided with an aperture there-through, said trimmer being adapted to be moved to a position whereby to form a closure plate for one end of the receptacle, a removable mold adapted to be disposed in alignment with the receptacle and the aperture in the trimmer, a plunger for forcing mat. from the receptacle into the mold, and means for actuating the plunger. A mold for forming nozzles comprising a bottom plate, a top plate, and a hollow body including a plurality of pivotally connected sections, the upper surface of said bottom plate being provided with a depression for snugly receiving the ends of the sections whereby to position the body and hold the sections in abutting relation.

Process for refining zirconium-containing ores and other products containing dioxide of zirconium. OTTO RUFF. U. S. 1,535,687, April 28, 1925. The process of refining zirconium containing ores or products containing dioxide of zirconium, which comprises htg. the same with a haloid salt of zirconium or with mats. forming such haloid salt, at a temp. sufficient to vaporize the resultant haloid salts of the contaminating elements.

Apparatus for and method of making vitreous silica. PHILIP K. DEVERS. U. S. 1,536,821, May 5, 1925. The method of making vitreous silica which consists in fusing silica in an enclosed space while maintaining a vacuum in said space and thereupon compressing the fusion at a pressure high enough to substantially eliminate bubbles.

Quartz working. LEVI B. MILLER. U. S. 1,537,036, May 5, 1925. An app. for prepg. fused or vitreous silica comprising the combination of a refrac. container, one part of which has a greater diameter than the adjoining part and having a tapered throat connecting said parts, means for htg. said container, and means for evacuating the space within said container. The method of prepg. fused or



vitreous silica which consists in htg. crystalline silica to a temp. of plasticity, subjecting said plastic silica to advancing constrictive press. to eliminate cavities in said silica, and causing said silica to congeal while substantially preserving the cross-section thereof.

White Ware

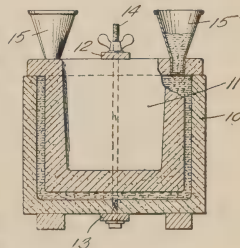
Fundamental factors in the use of pottery plaster. U. S. GYPSUM CO. *Ceram. Indus.*, 4 [3], 216-22(1925).—This article is believed to be the first on this subject ever prepared and authorized by a manufacturer of pottery plaster in the U. S. It represents the result of 18 mos. of research work on the part of the U. S. Gypsum Co., including extensive field work among the potteries. The various sources of gypsum from which pottery plaster is made, are listed and its method of manuf. is described which involves a carefully controlled calcination process. A chart shows the effect of consistency on the wet and dry density, dry compressive strength and water absorption of the dried cast. For a consistency of 72 pts. of water per 100 lbs. of plaster, the wet density is 95.1 lbs. per cu. ft.; the dry density is 63.7 lbs. per cu. ft.; the ultimate dry compressive strength is 1640 lbs. per sq. in.; and its water absorption is 36.2% of its dry wt., or 22.1 pts. of water absorbed per cu. ft. of mold. For a consistency of 90 pts. of water per 100 lbs. of plaster the wet density is 90.6 lbs. per cu. ft.; the dry density is 55.2 lbs. per cu. ft.; the dry compressive strength is 850 lbs. per sq. in.; and the water absorption is 47.3% of the dry wt., or 25.2 pts. of water absorbed per cu. ft. of mold. In several different potteries making the same kind of ware, a min. consistency of 59 pts. of water per 100 lbs. of plaster, giving a compressive strength of 2400 lbs. per sq. in., was found in one plant and a max. consistency of 93 pts. per 100 lbs. plaster, having a compressive strength of only 600 lbs. per sq. in., was found in another. Those potteries using the denser mixes obtain nearly twice as much wear from their molds as those using thinner mixes. Molds should be made as dense as local conditions will permit. Another chart shows the effect of time of blending on the strength of the cast. The point of max. strength occurs just before the set commences. As soon as the set commences pinholes become very numerous due to entrapped air. The time of blend should not exceed 6 mins. and 4 mins. is recommended so as to guard against pinholes. Temps. up to 145°F may be used in drying molds, providing great care is exercised to see that they are removed as soon as they are dry, because thereafter any temp. exceeding 120° F. will cause combined water to leave the molds, resulting in their being burned. A burned mold will crack on being put into use again. Molds are also liable to crack if they are exposed when warm, to cool draughts of air. If molds are not dried thoroughly between casts they are liable to become soft and weak and "sweat-out." When sodium silicate and sodium carbonate are used in the "slip" the molds will effloresce. There is no certain way of preventing this as it is due to the formation of soluble sodium sulphate which is carried to the surface and deposited. Calcium carbonate and calcium silicate are also formed but are retained in the mold due to their insolubility. P. D. H.

PATENTS

Process of casting pottery. ALFRED E. STACEY, JR. U. S. 1,536,358, May 5, 1925. The hereindescribed process of casting pottery which consists in using a fluid slip which is heated to a temp. higher than natural temps., and casting the heated slip into the desired shape.

Equipment and Apparatus

Crushing. J. FUENTES. *Quimica e Ind.*, 2, 5-8(1925).—Describes various grinding and crushing machinery which is used in the chem. engineering indus. The illustrations



show both Amer. and European machinery and general comments upon application and service to which best adapted. S. S. C.

An automatic and continuous recording balance (the Oden-Keen balance). J. R. H. COUTTS, E. M. CROWTHER, B. A. KEEN AND S. ODEN. *Sci. Abstr.*, **28** [4], 258 (1925); *Roy. Soc. Proc.*, **106**, 33-51 (1924).—This is a development from the original self-recording balance devised in 1915 by S. Oden. In that the record was obtained by an automatic registration of the time of release of small steel spheres, discharged one by one into a pan of the balance each time the weight of the substance being experimented on had changed by an amount equal to the weight of a sphere (the smallest which can be used in practice being one of 0.0153 gm.). The app. described in the present paper is an improvement on the above, giving greater detail and accuracy. An electromagnetic control is used, and so a continuous record is substituted for the discontinuous one of the earlier apparatus, but it has been found an advantage to retain the ball-dropping device, the electromagnetic control simply supplying the continuous history of the changing weight between the release of each metal sphere. The alternative was electromagnetic control over the whole range, the chart being split up (to secure sufficiently open scale) by some arrangement of counter (or "setting up") currents increased by an appropriate amount after each transit of the chart. But this demanded currents of considerable strength to balance a comparatively small increase in weight. The chosen method is one in which the ball-dropping can proceed up to the max. load the balance can carry. The max. current is no greater than the equivalent of the weight of one sphere, and the sensitivity is approximately constant throughout the range for a given set of balls. It can also be varied as desired. The balance is a short beam Oertling analytical balance to carry 100 gm. The electromagnetic control is effected by a magnet, suspended from one pan of the balance, dipping into a solenoid, the current through which is automatically adjusted so that the pull always balances the changing weight of the substance under observation. A continuous record of current strength thus gives a continuous record of the weight of the substance. Besides a complete discussion of the instrument, illustrations are given of applications to the study of sedimentation and flocculation of soil particles, and the evaporation of water from fibers. A. F. G.

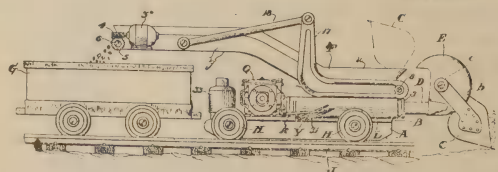
Glass filter apparatus. P. H. PRAUSNITZ. *J. Soc. Chem. Ind.*, **44**, 402-3 (1925).—Porous discs are made by grinding glass, sieving it to definite grades and fritting the glass powder in molds so that the edges of the particles stick firmly together, while the pores are left open. The filter discs are fused into dry parts of transparent glass just as if two tubes of glass were fused together. The size of pores is of no consequence, but the glasses to be joined must have the same chem. compn. Apparatus made on this principle can be used for all sorts of lab. work, to replace GOOCH or NEUBAUER crucibles, paper filters, or paper thimbles in extinction tubes. Mercury filters, air-filters, electro-chem. diaphragms, gas-washers, extractors of all kinds, and mercury safety-valves have been devised. The app. is made by SCHOTT of Jena. H. H. S.

The development of the Hardinge mill. J. C. FARRANT. *Chem. Age* (London), **12**, 300-1 (1925). (C. A.)

PATENT

Shoveling and loading machine.

JOHN C. BRACKETT. U. S. 1,536,282, May 5, 1925. A shoveling and loading mach., comprising the combination of a base, a shovel, means for thrusting said shovel forwardly and back, means includ-



ing a cylindrical press. chamber, and a pivotally supported flat piston swinging in said press. chamber for raising and dumping said shovel.

BOOKS

Mechanical Mixing Machinery. LEONARD CARPENTER. London: E. Benn, Ltd. 138 pp. 6s. Reviewed in *Chemistry and Industry*, **44**, 233(1925). (C. A.)

Agitating, Stirring and Kneading Machinery. H. SEYMOUR. London: E. Benn, Ltd. 139 pp. 6s. Reviewed in *Chemistry and Industry*, **44**, 261(1925). *Ind. Eng. Chem.*, **17**, 544. (C. A.)

Kilns, Furnaces, Fuels and Combustion

The radiation and conduction of heat from a muffle kiln. ANON. *Sprech.*, **58**, 260-1(1925).—The radiation and conduction of heat through a muffle was determined between 350-800°C. The heat condy. was obtained from the formula $C = (T-t)$. The average value was found to be 2.34×10^{-4} g. cal. per sec. per cm.² The observed heat of radiation corresponded very closely to that calcd. from the STEFAN-BLOTZMANN formula. At high temps., (above 500°C), it was found that the heat radiated from the muffle was so great compared with that conducted from the same that no great accuracy is necessary to determine heat condy. at high temps. H. G. S.

The proper control of smoke in ring and zigzag kilns. J. KOTTERBA. *Deut. Töp. Ztg.*, **56**, 282-4(1925). H. G. S.

Combustion devices for gaseous fuels—IV. W. TRINKS. *Fuels and Fur.*, **3**, 35 (1925).—A continuation of a series of articles by the author. In this are described various types of burners which work with complete mixing of gas and air before the mixture enters the fur. proper. R. D. L.

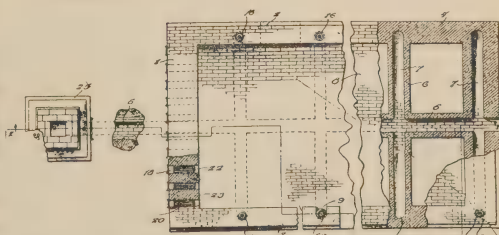
Tunnel kilns in the refractories industry. PHILLIP DRESSLER. *Fuels and Fur.*, **3**, 127-32(1925).—A description of the adaptability of the continuous car tunnel kiln to firing various shapes and sizes, with possible capacities. R. D. L.

Tunnel kilns for burning silica brick. PHILLIP DRESSLER. *Fuels and Fur.*, **3**, 243-7(1925).—Description of a new type of cross-fired regenerative kiln adapted to firing silica brick when space does not permit of such a kiln length as would otherwise be required or to firing common clay brick where large tonnages are required in one unit. R. D. L.

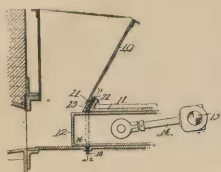
Advantages and disadvantages of the tunnel kiln. ANON. *The Clay Worker*, **83** [5], 442-4(1925).—This is the first of a series of articles on this subject. In it are given the opinions of European engineers on the use of the tunnel kiln in the brick industry. The tunnel kiln is not compared with periodic kilns, as periodic kilns are used but little in the firing of brick and tile in Europe, but instead it is compared with other forms of continuous kilns, the progressing fire or annular kiln and the modification known as the "zigzag" kiln. P. D. H.

PATENTS

Brickkiln. JOHN F. SHERBAHN. U. S. 1,535,260, April 28, 1925. The combination of a brick kiln having a fire-box in its front wall in direct communication with the interior of the kiln, a stack in spaced relation to the front wall of the kiln, a fire-box in said stack, and a return flue extending longitudinally under the floor of the kiln and establishing communication between the kiln and the base of the stack.

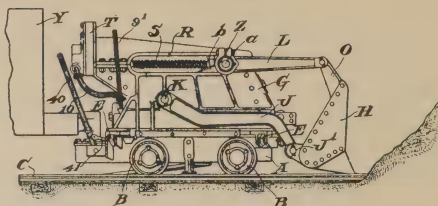


Packing construction for stoker plungers. ROBERT SANFORD RILEY. U. S. 1,535,341, April 28, 1925. An automatic underfeed stoker having, in combination, a coal

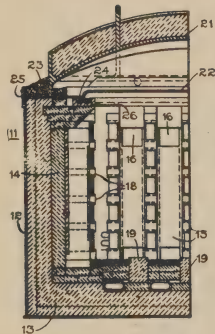


said ring against said piston as the latter moves away from said hopper.

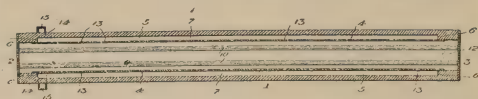
Shoveling machine. HAROLD I. STAGE. U. S. 1,535,381, April 28, 1925. A shoveling and loading mach. comprising, in combination, a frame, a scoop, means for thrusting the scoop forward in a lineal, substantially horizontal direction, means for withdrawing the scoop in a swinging direction over and to the rear of the frame and means independently controllable for tilting the scoop before withdrawal.



Electric resistor furnace. THOMAS A. REID. U. S. 1,535,547. April 28, 1925. An electric-resistance fur. comprising a plurality of refrac. walls enclosing a fur. chamber, a plurality of longitudinally spaced-apart sets of relatively narrow and laterally spaced-apart refrac. supporting members supported by said refrac. walls and projecting into said chamber, relatively thin and narrow resistor-supporting plates each having a plurality of laterally extending grooves in one face thereof, a relatively heavy unyielding preformed resistor member supported at spaced intervals by said grooved plates in coöperation with the refrac. walls, and means for maintaining said grooved resistor-supporting members in operative engagement with said refrac. supporting members.



Drier or preheater. ELLSWORTH P. OGDEN. U. S. 1,536,406, May 5, 1925. A drier or preheater of the tunnel type wherein the ware enters one end thereof and, after progressing therethrough, emerges from the other end thereof, having interior metal or other heat-conducting walls and a chamber or space back of said walls, and means for delivering heated air to said space for the purpose of heating said walls.



Geology

Italian potash industry by utilization of volcanic rocks (leucite). C. Rossi. *Atti Congr. Naz. Chim. Ind.*, 130-3(1924); *J. Soc. Chem. Ind.*, **44B**, 240-1(1925).—The magma of basalt, with which leucite occurs, is magnetic, and sepn. may be effected by the action of an electro-magnet on pieces crushed to 3-5 mm. thick. For each ton of leucite about 3 T. of basalt are obtained: this may be used for making mortar, artificial bricks, cement, paving, insulators, etc. The leucite, contg. 15-18% K_2O , is treated by MESSERCHMITT's process, which consists in heating under a pressure of 20 atm. with a soln. of $NaNO_3$, the products being KNO_3 and the insol. sodium aluminum silicate "analcime." Analcime may be utilized in various ways, either by treatment with H_2SO_4 to form soda alum, or by heating with lime to form $NaOH$ or sodium aluminate, or as a substitute for permutite for water-softening.

H. H. S.

Geochemical distribution of the elements. V. M. GOLDSCHMIDT. *Kristiania Vindensk.-Selsk. Skr.*, No. 3(1923); Nos. 4 and 5(1924); *Science Progress*, 19, 564(1925).—G. views the earth as a system in which there has been a sepn. of shells of diff. densities. He divides the elements into 4 groups accordingly: *Siderophile* (e. g., Co, Pt) concd. in the Ni-Fe core; *Chalcophile* (e. g., Cu, Zn, Pb, Au) concd. in the sulphide-oxide zone; *lithophile* (e. g., Mg, Ca, Na, K) concd. in the silicate shell; and *atmosphile* (e. g., N, Ar) in the vapor envelope. The fate of the rarer elements depends on whether they can enter isomorphously into cryst. compds. of the common rock elements. Thus Ba, Sr, Rb, enter the feldspars, while elements which are only feebly isomorphous are concd. in residual liquids and gases and appear in pegmatites and ore deposits. The histories of V, Fe, Ni, Cu and Zr as sample elements, are sketched in regard to their phys.-chem. relations from the initial earth mixt. to their present distribution in the lithosphere. H. H. S.

Bentonite. JEROME ALEXANDER. *Ind. & Eng. Chem.*, 16 [11], 1140(1924).—A. describes occurrence and properties of this natural mat., found chiefly in Texas, Wyo. and Calif. and defined as "A group of clay-like materials characterized by an alkaline oxide and alkaline earth content of 5 to 10%, fine grain size, high adsorptive powers, and usually very strong colloidal properties." Color varies from white to cream, grey, pink, brown, or even black, depending on nature of impurities present. Its color when fired is white, buff or brown. Softening point according to SCHURECHT and DOUDA is cone 1 to 30, % water of plasticity 22.07 to 114.61, % vol. by shrinkage (in terms of dry vol.) 24.21 to 195.81. They found that the addition of 32 parts of bentonite to 50 of flint and 50 of kaolin ran the mod. of rupture from 43.87 to 319.37 lbs. per sq. in. Other uses of interest to ceramists are said to be in frit for suspending enamels, Manson finding that the addn. of 1% instead of 2.5% of clay in grinding a frit for making a ground coat results in a much better suspended mixt. than had ever obtained before. Cox finds that bentonite added to some mineral mixts. will produce the exact plasticity found in clays liked by practical potters. N. Car. kaolin mixed with it can be made to have all the plasticity of a high grade ball clay. It is used as a good bonding mat. for electrical and chemical porcelain graphite crucibles, abrasive wheels, etc. R. D. L.

Bauxite in northeastern Mississippi. E. F. BURCHARD. U. S. Geol. Survey, *Bull.*, 750G, 101-46(1925).—More than 100 analyses of bauxite and clays are recorded. Compared with the bauxites of Ga., Ala., Tenn. and Ark., the Miss. bauxites range from 10 to 15% lower in Al_2O_3 , much higher in Fe_2O_3 , somewhat higher in SiO_2 , practically the same in TiO_2 and lower in their H_2O content. The deposits in 10 counties are described. The deposits in 4 of these counties are estd. to hold $1\frac{1}{2}$ million long tons, 80% of which carries from 30 to 45% Al_2O_3 . Mining of these deposits will have to await the construction of motor truck roads, the depletion of other domestic bauxite fields and the development of large power plants on the nearby Tenn. river. (C. A.)

Bentonite. H. S. SPENCE. Can. Bur. Mines. *Mines Branch*, No. 626, 31 pp. (1924).—The deposits of bentonite in Canada and in the U. S. are described. The mineral is a kind of clay 90% of which consists of SiO_2 , Al_2O_3 and H_2O in the proportions of about 61 to 18 to 10, resp.; the remaining 10% consists of oxides of Fe, Mg, Ca, Na, K, Ti and very small amts. of S, P and C. Among the 24 uses of bentonite which are mentioned, its application in the paper, dye, fertilizer, ceramic and oil-refining industries is most promising. (C. A.)

Clay and shale deposits of Ontario. J. KEELE. Can. Dept. Mines, Geol. Survey, *Memoir*, 142, 170 pp.(1924).—Chem. analyses were made of about 60 samples of the clays and the usual phys. tests were applied to det. the fitness of the clays for industrial purposes. The geographical distribution of the clays throughout the province is described, also the methods of testing clays. (C. A.)

BOOK

The data of geochemistry. F. W. CLARKE. Washington: *U. S. Geol. Surv. Bull.*, 770. Pp. 841. Price \$1.00. H. H. S.

Chemistry and Physics

Determining oil efficiencies in water gas manufacture. L. J. WILLIEN. *Gas Age-Rec.*, 55, 603-6(1925).—An attempt to solve the B. t. u. oil efficiency in water gas operation is described in quite some detail. W. attempts to express the efficiency of the gas oil in an accurate manner so that it will be applicable to any set. The discourse is entirely given over to calcn. and tabulation of results. The reasons for various calcn., and the source of derivation is given and soln. of theory carried out. S. S. C.

Determination of FeO in rocks. L. LOSANNA AND G. FERRERO. *Giorn. Chim. Ind. ed Appl.*, 7, 140-2(1925).—A sample of the pulverized rock is placed in a flask with 5 gr. of anhydrous K_2SO_4 . Steam is passed into the flask with a stream of CO_2 and H_2SO_4 . The system is kept closed and operated at temps. of 200-250°C and for various lengths of time depending upon the material being tested. A cut is given showing the setup and general details. Results of the method are compared to that of TREADWELL and a table shows the variations in the two methods. Where porphyrite, etc. were analyzed this method gave higher results but in the case of bauxite, and other argillaceous mats. it was much less. The analysis or rather the obtaining of the FeO in a solution form depends upon the keeping out of O_2 and then the analysis is carried on in the standard method. S. S. C.

Standard density and volumetric tables. ANON. *Sci. Abst.*, 28 [4], 257(1925); *Bur. Stand., Circ.*, No. 19(1924).—This circular contains standard density tables and others of a similar nature most often required in physical and chemical laboratories. For example, the density of various percentages of ethyl alcohol at various temperatures; the density and pounds per gallon of milk and cream, and of American petroleum oils; temperature corrections to the indications of hydrometers in alcohol, sugar, petroleum oil and sulphuric acid solutions. Tables are also given showing the relation between degrees Baumé and specific gravity for both heavy and light liquids; the relation of degrees A.P.I. and specific gravity; the capacities of glass vessels from the weight of water contained or delivered; and master scales for the graduation of hydrometers (alcohol-meters). A. F. G.

Heating and cooling of plates and walls. ANON. *Fuels and Fur.*, 3, 381-4(1925).—A method of solving, graphically, the ht. flow through plates or walls of any mat. of any thickness, of constant or varying densities or several layers of mats. or varying densities and thicknesses. R. D. L.

The Rhe as the absolute unit of fluidity. EUGENE C. BINGHAM. *Ind. & Eng. Chem.*, 17 [1], 47(1925).—The abs. unit of fluidity has no name, the awkward term "reciprocal poises" coming into use. In order to avoid this, author suggests the term "rhe" from the Gr. *Rheo* (flow), to be pronounced *Ree*. Need for a commission to be chosen to measure the viscosity of water as a calibration standard, at 20°C is pointed out, since at present the error is 0.3% on account of present literature not recognizing all the corrections which are now familiar. R. D. L.

Extraction of alumina from clay. H. SPECKETER. *Z. phys. Chem.*, 110, 514-20(1924); *J. Soc. Chem. Ind.*, 44B, 97(1925).—In the alk. process clay is treated with lime at a high temp., and the calcium aluminate is decomposed with alkali; the Al_2O_3 yield being about 70%. In the acid process, the previously heated clay is treated with H_2SO_4 or HCl, preferably the latter as being less costly to recover. The yield here is 90%. H. H. S.

Titanium oxide preparation and refining. T. MATSUBARA. Osaka Ind. Lab., *Bull.*, **4** [13], 1923; *J. Soc. Chem. Ind.*, **44B**, 97(1925).—Korean titanium ore has the compn.: TiO_2 25.90, SiO_2 4.58, Fe_2O_3 58.85, Al_2O_3 1.10, CaO 4.08, MgO 3.60% (=98.11). The ore, ground as finely as possible, is decomposed with conc. H_2SO_4 , avoiding excess of acid. If refined titanic acid be dehydrated at temps. above 400°C , undesirable yellow tints are formed.

H. H. S.

The third National Colloid Symposium. *Science*, **61**, 463-4(1925).—This is to be held at the Univ. of Minnesota on June 17, 18 and 19 and carries papers, among others, on adsorption, colloid chemistry of soils, colloids in geol., the centrifugal method for detn. of the distribution of size of particles in colloidal solns. and the motion picture as an aid to colloid research.

H. H. S.

Sodium silicate solutions. Relation between composition and boiling point. J. Y. CANN AND D. L. CHEEK. *Ind. Eng. Chem.*, **17**, 512-4(1925).—Boiling pt. is elevated according to % Na_2O , although differently with diff. brands. "BW" is Na_2O 1.68 SiO_2 ; "Star" is Na_2O 2.55 SiO_2 . The "BW" curve is more abnormal than the "Star" at low concns.

H. H. S.

Suspensions and their relation to colloidal stability. W. T. H. WILLIAMSON. *J. Soc. Chem. Ind.*, **44**, 402(1925).—Suspensions resemble colloidal solns. in that the particles carry an electric charge and are pptd. by ions of opposite sign. A kaolin suspension, from which particles below 0.002 mm. diam. had been removed, was negatively charged, and the particles were pptd. more rapidly in acid soln. than in alkaline when no salt was present. Normally, increased salt concn. increases rate of sedimentation, but there are exceptions, notably monocalcium phosphate and the chlorides of Na, Al, Fe and La. In alk. soln. NaCl behaves normally; in acid soln. it decreases sedimentation. Monocalcium phosphate causes quicker sedimentation in alk. soln. than with the same concn. in acid soln. Salts contg. trivalent cations at certain concns. brought about a much greater sedimentation at pH 7 to 8 than at any other reaction, while beyond these concns. the charge was reversed in sign. Comber's work on the difference between silt and clay is described. Silt is more rapidly pptd. by a neutral Ca salt than by $\text{Ca}(\text{OH})_2$, whereas with clay the opposite occurs. This is explained by assuming that clay is protected with colloidal silicic acid. ARRHENIUS suggests that clays are ampholytes; the curve, rate of settling: pH, is similar for clay and for gelatin; therefore clays should have an isoelec. pt., but DAYHUFF and HOAGLAND say that clay has no iso-electric pt. in the sense that a protein has.

H. H. S.

Practical results of the theoretical development of chemistry. F. HABER. *J. Franklin Inst.*, **199**, 437-56(1925).

H. H. S.

Standard density and volumetric tables. ANON. Bur. of Standards, *Circ.*, No. 19, 72 pp.(1924).—Tables show: d. of mixts. of EtOH and water; d. of mixts. of MeOH and water; % by vol. corresponding to various % by wt. for EtOH: H_2O and for MeOH: H_2O mixts., and % by wt. corresponding to various % by vol. of mixts. of H_2O with EtOH; temp. corrections for readings of alcoholometers, of saccharometers, and of hydrometers in H_2SO_4 and in petroleum oils; d. of sucrose solns.; d. of H_2SO_4 ; relations among degrees Bé., degrees A. P. I., lb. per gal., gal. per lb. and sp. gr.; sp. gr. and wt. per gal. of milk and cream; vol. of milk and cream at various temps. occupied by unit vol. at 20° ; conversion of d. basis; d. of air; diff. between mass and apparent wt. of water weighed in air; d. of water; temp. corrections for glass volumetric app. and for volumetric solns.; reduction of weighings to vacuum; calcn. of capacity of glass vessels; master scales for graduation of hydrometers to indicate % EtOH.

(C. A.)

Method of determining melting points. ANDRÉ DUBOSC. *Rev. prod. chim.*, **28**, 115(1925).—Two small Pt spheres at the end of Pt wires are coated by dipping in the melted substance to be examd. and allowing to cool. They are inserted in an elec.

circuit contg. a bell and are immersed in a cold Hg bath contg. a thermometer placed between the spheres. The bath is slowly heated, and as soon as the substance melts the circuit is closed and rings the bell. (C. A.)

Calorific values, and heats of combustion. C. DE LA CONDAMINE. *Chaleur & Ind.*, **4**, 634(1923); *J. Soc. Glass Tech.*, **8**, 202.—A discussion of the data involving the heats of combustion of C, CO, H, the reactions of water vapor and C, and C and CO₂. (C. A.)

The electrical charge on a clay colloid as influenced by hydrogen-ion concentration and by different salts. W. C. DAYHUFF AND D. R. HOAGLAND. *Soil Science*, **18**, 401-8(1924).—The relative cataphoretic velocities of a colloidal clay measured by a modified U-tube method were approx. const. between pH 5 and 10 and decreased with further increases in either acidity or alk. In all cases the clay had a negative charge. Neutral salts had a depressing effect on the charge which was more marked with the multivalent cations. It is suggested that the deflocculating influence of an alk. reaction may be due to the indirect effect upon the soly. of the multivalent cations instead of the direct effect of the OH ion. (C. A.)

The complete utilization of leucite as a source of alumina, potash and silica. G. A. BLANC. *Atti congresso naz. chim. ind.*, **1924**, 119-30.—A review and discussion of researches by B. which have led to the isolation of Al, K and Si compds. in an economically valuable form from leucite, some of which work has appeared in patents (C. A., **16**, 2202, 3176, 3736; **17**, 1309). Though ordinary electromagnetic methods are inefficient for concg. leucite, advantage was taken of the discovery that basaltic lava acquired a magnetism induced by the magnetic field of the earth and in the same direction, which on solidification became permanent. By crushing the leucite rock fine enough, a mixt. of non-magnetic leucite and particles of permanently magnetic gang was obtained. Sepn. could not be made by ordinary methods because in such magnetic fields no movement other than rotation occurs. But by utilizing the magnetic movement of the particles themselves and allowing them to orient along the lines of force of an external field, they could then be transported through the field by ordinary methods. In this way leucite can be concd. on a large scale to 95%, cheaply and with small power. The liberation and sepn. of AlCl₃, KCl and SiO₂ are described in the patents (*loc. cit.*). AlCl₃ is then transformed to Al(OH)₃ with recovery of HCl by a cyclic process based on the decompn. of crystd. Al₂Cl₆.12H₂O to Al₂O₃.3H₂O and HCl, the operation being best carried out in Al app. and the HCl being used for dissolving more leucite. By treating the KCl with H₂SO₄, all HCl can be recovered and utilized continuously in the closed cyclic process. By this process 1 ton of leucite (18% K₂O) requires 187.4 kg. of H₂SO₄, yielding 332.9 kg. of K₂SO₄. Data on the H₂O used in this cyclic process and on the thermal economy of the latter are also included. After its initial crystn. the KCl is 99% pure and is suitable for all common purposes such as electrolysis, production of K₂SO₄, KClO₃, KMnO₄, etc. The Al₂O₃.3H₂O contains less than 0.001% Fe with SiO₂ absent and is easily sol. in H₂SO₄ and therefore suitable for prepg. Al₂(SO₄)₃. Calcination yields Al₂O₃ of high purity for the manuf. of Al. The SiO₂ residue is amorphous with traces of gang, augite, etc. When dried and ground, the impurities are coarser and a SiO₂ powder of great whiteness, fineness and purity is obtained. It has a remarkable power of absorbing gases, decolorizing solns., etc. It is also completely sol. in aq. NaOH and KOH so that solns. of pure Na and K silicate of any concn. can be obtained without the usual autoclave method. If HCl is replaced by HNO₃ similar results are obtained except for the sepn. of KNO₃ from Al(NO₃)₃. On cooling the soln. after attack of the leucite, almost pure KNO₃ first seps. when the temp. and acidity are suitable, followed by a mixt. composed largely of Al(NO₃)₃. This mixt. by subsequent treatment is split into Al(OH)₃ and KNO₃ which are then sepd. by lixiviation. Traces of Fe are easily eliminated and HNO₃ is recovered from the Al(NO₃)₃. (C. A.)

BOOK

Gmelin's Handbuch der anorganischen Chemie: System No. 32, Zink. R. J. MEYER. German Chemical Society, 8th ed., 1924. H. H. S.

PATENTS

Method of making magnesium chloride. RICHARD C. LORD. U. S. 1,537,479, May 12, 1925. A process of making magnesium chloride which consists in treating the ammonium chloride mother-liquor of the ammonia-soda process with dolomitic lime so that the calcium oxid (or hyroxid) added will be sufficient to react quantitatively with the ammonium chloride in the liquor; expelling the liberated ammonia; treating the slurry so formed with gas containing carbon dioxide, until the magnesium oxid (or hydroxid) is converted into magnesium chloride, filtering off the pptd. calcium carbonate and evaporating the liquor with removal of the salt (NaCl) to a solid magnesium chloride.

Manufacture of aluminum sulphate. ARTHUR J. MOXHAM. U. S. 1,538,837, May 19, 1925. The process of treating potash-alum which consists in first driving off the water and then separating the sulphates by dissolving the potassium sulphate in strong sulphuric acid and then separating the aluminum sulphate residue from the soln.

Chemically-prepared iron-bearing material. ARTHUR J. MOXHAM. U. S. 1,538,838, May 19, 1925. A mat. suitable for the manuf. of iron and steel which is substantially free of silica and water and contains oxides of iron and other metals resulting from the decompn. by heat of mixed sulphates chemically prepd. from an iron ore.

Method for the production of aluminum hydroxide. ARTHUR J. MOXHAM. U. S. 1,538,839, May 19, 1925. The process of extracting alumina from minerals containing it, which involves first treating the mineral to obtain a solution of aluminum sulphate and then adding metallic iron to the solution to decompose the sulphate and precipitate aluminum hydroxide.

Chemically-prepared iron-bearing material. ARTHUR J. MOXHAM. U. S. 1,538,840, May 19, 1925. A mat. suitable for the manuf. of iron and steel which is substantially free of silica and water and contains ferric oxide and oxides of manganese, resulting from the decomposition by heat of mixed sulphates chemically prepd. from an iron ore.

Aluminium hydroxide. G. MUTH. U. S. 1,527,903, Feb. 24, 1925. Natural Al silicates such as china clay are heated with NaOH in the presence of H₂O to the b. p. under ordinary atm. pressure to form an easily decomposable double silicate and this is then heated with additional alkali at a temp. of about 140° to produce Na silicate and Al(OH)₃. (C. A.)

Alkali chromates. NATIONAL ELECTROLYTIC CO. Brit. 226,066, Feb. 15, 1924. In producing chromates by roasting a mixt. of Cr ore, alkali carbonate and lime or other absorbent at a temp. above the m. p. of the carbonate, the mixt. is agitated during its passage through a furnace until it is cooled below the m. p. of the chromate produced, so that a granular product is obtained. A special furnace is described. (C. A.)

General

Combustion devices for solid fuels. W. TRINKS. *Fuels and Fur.*, 3, 233-9(1925).—A comprehensive treatise on burning bituminous coals on various types of grates, with theory of combustion, differences in requirements of different kinds of furs, and effect of coal sizes, coking qualities and conductivity of fuel bed on detn. of relation of draft to rate of combustion. R. D. L.

Utilizing gas supplied at low pressures. M. H. MAWHINNEY. *Fuels and Fur.*, 3, 339-43(1925).—The design of pipe lines and burners for industrial furs. where both gas and air are supplied at low press. with soln. of a typical problem. R. D. L.

Silicosis. ANON. *J. Soc. Chem. Ind.*, 44, 428(1925). Silicosis, or potter's asthma, is the subject of an inquiry at the present time by medical officers of the English

Govt. in N. Staffordshire. Many operatives are undergoing medical examn., and the investigators are receiving coöperation from both employers' and workpeoples' organizations. Practical expts. with various types of vacuum cleaners are being carried out with the object of removing dust before it can rise. H. H. S.

The influence of J. Willard Gibbs on the science of physical chemistry. F. G. DONNAN. *J. Franklin Inst.*, 199, 457-83 (1925). H. H. S.

BOOK

Preparation of Scientific and Technical Papers. SAM F. TRELEASE AND EMMA S. YULE. Baltimore: Williams & Wilkins Co. 113 pp. \$1.50. Reviewed in *Ind. Eng. Chem.*, 17, 435 (1925). (C. A.)

BOOK REVIEW

Dictionary of Tariff Information. U. S. Tariff Commission, Washington, D. C. 1924. 1036 pp. 19.5 × 26 cm. \$2.25.

The introduction concisely states the general contents of the dictionary as information of three types (1) technical and statistical data relative to commodities mentioned in the tariff act of 1922 (2) description of tariff systems, methods, practices and history (3) a table with index comparing the tariff rates of the tariff acts of 1909, 1913 and 1922. The articles under classes (1) and (2) are grouped together in one alphabetical series to form the dictionary proper, class (1) covering some 450 pages and class (2) 400 pages. Class (3) occupies 171 pages.

On page 725 the dictionary carries the following statement of the functions of the U. S. Tariff Commission. "The regular work of the Tariff Commission previous to 1923 may be divided into three general categories having to do with (1) specific commodities, (2) methods of customs administration, and (3) customs policies and international commercial relations." With reference to the work on commodities the dictionary note is of importance.

1. Commodities. Tariff information surveys. "In contemplation of a future revision of the tariff act, the Tariff Commission soon after its organization outlined a plan for a standard form of pamphlet which was to be prepared for every commodity mentioned in the tariff act. These pamphlets, known as Tariff Information Surveys, were designed to bring together all available information which it was thought would be of service to Congress in connection with a revision of the tariff.

Each survey gives a description of the article under discussion; its various grades and uses; the domestic production of the article, with special reference to the raw materials required for manufacture; and data as to the relation of domestic production to consumption, the volume of imports, and the countries from which these imports come. If a commodity is one in which the United States production exceeds the consumption and an exportable surplus exists, the export trade is discussed and the principal countries of destination are shown. The survey also shows the amount, the nature, and the causes of foreign competition in the American market; the rate of duty on any given article under the various tariff acts since 1883, and decisions by the Treasury Department and the courts regarding classification of commodities under these laws."

The last revised edition of the surveys of interest to the ceramic industry was printed in 1921 and was based on the Tariff Act of 1913, as were all the surveys covering the numerous commodities. The statistics contained data up to and inclusive of the year 1919. The B series pertains to ceramics in general containing the pamphlet B-1 on brick and tile, B-2 lime, gypsum and cements, B-3 abrasive materials, B-4 clays and earths, B-5 mica, B-6 the pottery industry, B-7 manufactured earthy and mineral substances, B-8 carbon products, B-9 glass and glassware, B-10 scientific instruments and

apparatus, B-11 stone and manufactures of. Since these surveys were written the Tariff Act of 1922 was passed with its numerous changes in classification and rates of duties, with the subdivision of commodities into classes and arranged in schedules as schedule (1) chemical, oils and paints, (2) earths, earthenware and glassware, (3) metals and manufactures of, (4) wood and manufactures of, (5) sugar, molasses and manufactures of, (6) tobacco and manufactures of, (7) agricultural products and provisions, (8) spirits, wines and other beverages, (9) cotton manufactures, (10) flax, hemp, and jute and manufactures of, (11) wool and manufactures of, (12) silk and silk goods, (13) papers and books, (14) sundries, and (15) free list. Hence the surveys of tariff information series B properly belong to schedule 2. Each of the other schedules has its corresponding quota of surveys covering the respective commodities. Schedules 1 to 14 inclusive contain all products which are subject to duty, while schedule 15 contains an alphabetical list of commodities that are exempt from duty. Schedule 14 contains a varied assortment of products, those of ceramic interest being manufactured of asbestos, corundum, emery, abrasives, thermostatic bottles, etc. Among the items on the free list (schedule 15) are cements as Portland and other hydraulic, chalk, cryolite, flint stones, crude minerals, gypsum, salt cake, stone and sand.

In preparation for the Dictionary these surveys were employed as a basis for the technical data and statistics on the commodities. The general information was critically modified and abridged to suit the purpose of a dictionary. The statistics were checked and brought up to date and made practically complete through the year 1922, and where possible for the year 1923. This gives an opportunity to note the initial effect of the changes from the Tariff Act of 1913 to that of 1922. Although the rate of duty on china and porcelain was increased from 55% to 70% the importations for 1923 were higher than for previous years. The demand for plate glass in its various forms was acute enough to cause a greater importation for 1923 at the new higher rates than for former years, the importation of cast polished plate glass for 1923 having a value of 16 million dollars as against the next highest figure of 5 million for 1922. Glazed and decorated tile also show a large increase in importation for 1923 although the rate of duty is higher.

In the sections devoted to tariff systems, methods, practices and history the reader will find a great variety of subjects, as the balance of trade, colonial tariff policies, currents of world commerce, customs laws, dumping, dutiable value, tariff histories, tariff rates, wages and the protective tariff, only to mention some of the longer articles. The articles are replete with references to the literature. The dictionary also contains biographical sketches on noted economists and on men who have influenced the tariff legislation. Adam Smith is given his due, and we are reminded that John L. Hayes was instrumental in securing the passage of the wool bill of 1867.

In the section on the comparison of Tariff Acts of 1909, 1913 and 1922, the index contains the commodities arranged alphabetically giving the page in the text and the paragraph or section in the act of 1922. A glance at the paragraph shows the changes in rate for the three acts mentioned. China clay now has a rate of \$2.50 per ton similar to the act of 1909, whereas the rate was but \$1.25 in the act of 1913. The new act imposes a duty of 40% on philosophical, scientific and laboratory instruments, apparatus, utensils, etc. (paragraph 360) for all importers, whereas previous acts allowed such commodities to be imported free of duty by religious, educational and scientific institutions.

The dictionary can be recommended as an excellent addition to the library, and should prove of special value to manufacturers and importers, as well as to students of the tariff question.

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Abrasives

PATENTS

Abrasive composition. HENRY R. POWER. U. S. 1,539,694, May 26, 1925. An abrasive composition comprising abrasive particles and a gum, said compn. being substantially free from either silicate of soda or oil, substantially as described.

Antislip material. OTIS HUTCHINS. U. S. 1,541,220, June 9, 1925. An antislip floor or tread surface having cement with fragments embedded therein, said fragments being broken portions of fused alumina masses having a porosity of at least 25%.

Art

A lecture on Sèvres porcelain. WILLIAM KING. *The Pottery Gazette and Glass Trade Review*, 50, 574, 611-4(1925).—This is a report of a lecture delivered by K. at the Victoria and Albert Museum. The history of the Sèvres factory was outlined, with ref. to its influence on the history of European art. P. D. H.

Metallic luster. W. D. BANCROFT AND R. P. ALLEN. *J. Phys. Chem.* 29, 564-86 (1925).—A physico-psychological study of luster. H. H. S.

Cement, Lime and Plaster

Portland cement industry in Canada. A. G. FLEMMING. *Canadian Chem. and Met.*, 9, 117(1925).—Finally revised statistics on cement production as reported by the Mining, Metallurgical, and Chemical Branch of the Dominion Bureau of Statistics show sales of Canadian Port. Cement in 1925 totaled 7,498,624 bbls. valued at \$13,398,411 as against 7,545,589 bbls. worth \$15,064,661 in 1923. Exports were 153,520 bbls., a decrease of 340,231 bbls. Imports were 27,672 bbls. The consumption in 1924 was only 82% of the 1913 consumption. F. G. J.

Progress in ciment fondu in France. ANON. *Chem. Met. Eng.*, 32, 494(1925).—Ciment fondu is fused in elec. fur. at 1400°C. Its high alumina content, 42%, is obtained from bauxite. It is ground in rotary grinders to a high degree of fineness. Its chief value is in its rapid hardening. Its resist. after 48 hrs. is superior to that of ordinary cement after 28 days. It is being used now for rapid relaying of pavements where there is an intense continuous traffic. Wheeled traffic can use such repaired roads after 24 hrs. M. E. M.

Some modern gypsum products. J. M. PORTER. *Chem. Met. Eng.*, 32, 499-500 (1925).—Lists the gypsum structural products manufd. today. M. E. M.

Problems in cement and concrete research. C. R. PLATZMANN. *Rock Products*, 28 [9], 54-7(1924).—That the constitution of Portland cement has not found generally recognized determination is largely due to its being neither a pure chemical compound

nor of a pure physical or mineralogical nature. Thus research in this field has to deal with different combinations of methods. Investigations of Portland cement should cover the entire field of the system $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$. The effect of the substitution of Fe_2O_3 for Al_2O_3 offers new possibilities. The part taken by MgO must be considered from the four component system, $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2\text{-MgO}$. Other problems are: (1) hydration and hardening from the colloidal standpoint, (2) special high strength cements, (3) wet *vs.* dry process of mfg., (4) kiln draft, (5) potash recovery, (6) revision of standards, for methods of testing, (7) effect of storage on cement, (8) the use of cement, (9) the causes of disintegration, (10) the effect of calcium chloride, (11) the aggregate, (12) the effect of acid and salt solutions.

H. G. F.

Cements with high percentages of alumina. ANON. *Rock Products*, 28 [3], 48-9(1925).—In aluminous cements the weight of alumina is greater than that of silica, and the sum of the weights of alumina and silica are greater than the sum of the weights of lime and magnesia. Aluminous cements have been developed to withstand the action of sea-water containing CaSO_4 . They can be made by clinkerization but due to their small softening stage it is the practice to fuse the clinker in water-jacketed or electric furnaces. Iron oxide is transformed into steel and a high temp. is required to run the steel. The composition of aluminous cements is based upon the four aluminates of calcium. They are preferable from the point of cost per resistance kg. They are also more elastic than Portland cement and the time of setting is much shorter.

H. G. F.

Magnesia Portland cement. K. BALTHASAR. *Rock Products*, 28 [10], 50-2 (1924).—To maintain the selling value of Portland cement with as much as 8% magnesia it is necessary to vary the standard process of mfg. The mechanical treatment of raw materials and clinker remains the same. In dealing with a raw mix free from MgCO_3 the proportion of CaCO_3 is brought to 76.6%. With a high MgCO_3 content the per-

centage of CaCO_3 must be altered to maintain a ratio, $\frac{\text{CaO}}{\text{SiO}_2 + \text{R}_2\text{O}_3} = 2.10$, in order to produce a setting clinker. The calcination of high magnesia cement varies somewhat. The cement if properly made is equivalent to ordinary Portland cement. H. G. F.

Effect of end condition of cylinder on compressive strength of concrete. HARRISON F. GONNERMAN. Structural Materials Research Lab., *Bull.*, 14, May 28, 1925. (*Proc. A. S. T. M.*, 1924.)—Experience has shown that it is not always practicable to obtain perfect workmanship in the making of test cylinders. A common defect in test cylinders made in the field is uneven end surfaces. These tests were made for the purpose of detg. the effect of uneven and irregular ends and to study the effect of different methods of treating the ends in applying a compressive load. Other factors such as the use of spherical bearing blocks, the inclination of axis of specimen, and the deflection of the bed of the testing machine were also studied. About 3000 6 by 12-in. concrete cylinders of 1:7, 1:5, 1:3½ and 1:2 mix by volume were tested at ages of 7 days to 1 yr. The relative effect of the different end conditions was judged principally by the ratio of the strength obtained for a given condition to that obtained for a *standard method* specified in the "Tentative Methods of Making Compression Tests of Concrete" (Serial Designation C39-21T) A. S. T. M. This method requires that the cylinder be molded on a plane machined cast-iron base plate and that the top be capped when made by means of a machined cover plate and neat cement which has been mixed and allowed to stand 2 to 6 hrs. before use. Test to be made with a spherical bearing block on top of the cylinder. The principal conclusions from the tests were: (1) The standard method of molding and capping concrete cylinders with machined base and cover plates gave uniformly high strength, equal to or greater than that from any of the other methods. (2) For reliable results the use of an adjustable block with spherical bearing surfaces was found

to be essential. (3) Small errors ($1/4$ in. or less) in centering the bearing block on the cylinder had little or no effect on concrete strength. An error of $1/2$ in. in setting, gave strength-ratios of about 90% for 1:5 and 1:3 $1/2$ concrete. Smooth troweled tops (cylinders molded on machined base plates) gave the following results: (1) With thin caps of gypsum or mixtures of cement and gypsum, the results were essentially the same as those obtained for the standard method of capping. (2) Without bedding, the strength-ratios obtained were about 95% for 1:7 concrete, 94% for 1:5 concrete and 80% for 1:3 $1/2$ concrete. (3) With sheet materials between top of cylinder and the spherical block, the strength-ratios obtained were less than 100% for all of the material used. (4) For the sheet materials, the best results were obtained with beaver board, which gave strength-ratios of about 100% for 1:7 and 1:5 concrete and about 90% for 1:3 $1/2$. (5) For white-pine board, mill board and leather, the strength-ratios ranged between those found for beaver board and those found for no bedding. (6) For the other sheet materials, blotting paper, sheet lead and rubber, the strength-ratios were less than those found for no bedding. (7) The lowest strength-ratios were found for the $1/16$ -in. sheet rubber—about 80% for 1:7, 70% for 1:5 and 50% for 1:3 $1/2$ concrete. Cylinders made and capped by the standard method, tested with a $1/2$ -in. segment (circular segment of $1/2$ -in. mid-ordinate) of the cap removed, gave strength-ratios slightly less than 100%. When a 1-in. segment was removed the strength-ratios obtained were 100% for 1:7 concrete, about 95% for 1:5 concrete and 90% for 1:3 $1/2$ concrete. The removal of a 2-in. segment gave strength-ratios of 90%, 80% and 65% for the three concretes. When the segments removed were replaced with 1:1 gypsum and cement mortar 3 hrs. before test, the strength-ratios were about 100% except for the 2-in. segment, which showed strength-ratios of from 95% to 90%. Cylinders with plane parallel ends but with axes inclined, gave the same strength as standard cylinders for an inclination of $1/4$ in. in 12 in. and strength-ratios of about 92% for an inclination of $1/2$ in. in 12 in. Cylinders with top surface inclined showed strength-ratios of about 100% for an inclination of $1/4$ in. in 6 in. and of about 95% for an inclination of $1/2$ in. in 6 in. Cylinders molded with machined cast-iron plates so as to give convex ends and tested without bedding, gave pronounced reductions in strength even for a small convexity. The strength-ratios were smaller the greater the convexity and the richer the mix. For a convexity of 0.01 in., the 1:3 $1/2$ and 1:2 mixes showed strength-ratios of about 65% and for a convexity of 0.05 in., about 40%. For the 1:7 and 1:5 mixes the corresponding strength-ratios were about 80% and 55%. When tested with beaver board sheets top and bottom, the reductions in strength were about half as great as without bedding. The use of gypsum bedding for one group of cylinders with bases convex 0.05 in. gave strength-ratios of about 90%. The effect of concave ends was small compared to that of convex ends. Sheared steel plates 8 in. square by $1/4$ -in. thick, from warehouse stock, showed deviations from a true plane of as much as 0.012 in. Cylinders molded with these plates as bases and covers so as to give convex ends, gave results comparable with those from cylinders having the same convexity, similarly made with machined cast-iron plates. Finally, the most important conclusion from these tests is that great care must be exercised when preparing concrete cylinders for test in order to secure plane ends. When the standard method of capping with plane cover plates cannot be followed, the cylinder should be troweled smooth and capped with a thin layer of gypsum, or a mixture of gypsum and cement, 3 to 6 hrs. before test. The cylinders may be conveniently capped by placing a small amount of the capping material on a plane metal or glass surface and pressing the end of the cylinder down upon it, taking care to keep the cylinder in a vertical position during the operation. The cylinders should always be molded on a plane surface; in testing field cylinders which have not been so molded, it is recommended that the ends be capped with a thin layer of neat cement 2 or 3 days before test, following the method described above for troweled tops. The Standards and Tentative Stand-

ards of the American Society for Testing Materials require that the cylinders be tested in a damp condition.

Storing cement. R. GRÜN. *Tonind. Ztg.*, **49**, 473-80(1925).—A comprehensive study of the effects of storage upon the quality of cement was made which included tests on 20,000 specimens. It was found that cement did not deteriorate very much up to 3 years if stored in air tight containers. Upon exposure to air the strength of the cement decreases about 8% in 6 months, 14% in 9 months, and 22% in 1 yr. There is very little difference between the resistance of different German cements to storage.

H. G. S.

New building material made from Kieselguhr. ANON. *Quarry & Surveyors' & Contractors' Jour.*, **30**, 102(1925).—A new bldg. mat. made of kieselguhr, mixed with Port. cement and sawdust, is being extensively used in Austria and Czechoslovakia. Crushing tests have shown that diatomite blocks will stand 1100 lb. per sq. in., and that when stood on edge, as in walls, it will bear a load of 550 lb. per sq. in. The blocks can be used generally as a lining and ceiling mat., and as diatomite repels vermin, it would also help to overcome the objections on this score in connection with the new methods of bldg. in iron. The new mat. is fireproof. It is being manufactured in Vienna, Budapest and Prague.

O. P. R. O.

Use of calcium chloride in concrete construction. ANON. *Chem. Record-Age*, **23**, 8-9(1925).—The better grades of commercial CaCl_2 , today contain 73-75% CaCl_2 . The product is considered to be $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$. For use in concrete it is manufd. in flaked form and shipped in metal drums. It is best added as part of the gaging water, about 2-4 lbs., CaCl_2 being used per 100 lbs. of cement. It aids materially in placing concrete during cold weather, first by accelerating the time of set and allowing considerable strength to develop before the concrete freezes; and second, it produces a higher temp. within the concrete. CaCl_2 is also used on concrete highways for application on the surface instead of the usual layer of moist earth. By absorbing moisture from the air, it is dissolved and penetrates the concrete, leaving the surface moist.

H. H. S.

The molecular volumes of water in hydrated calcium sulphates. W. BILTZ. *Zeit. anorg. allgem. Chem.*, **143**, 231-2(1925).

H. H. S.

Influence of manganese on hydraulic properties of blast-furnace slags. R. GRÜN. *Stahl u. Eisen*, **44**, 1405-9(1924); *J. Soc. Chem. Ind.*, **44B**, 319(1925).—Cement made from manganiferous slag has a lower strength the greater the Mn content of the slag, especially for the first few days. If the Mn be practically eliminated by smelting the slag with C and Fe to produce ferromanganese and a Ca aluminosilicate, the slag has better hydraulic properties than the original slag before addition of Mn. The color produced in slag by addn. of MnO is first brownish yellow, then greenish yellow, and finally green. With 3% MnO , yellow fern-like inclusions may be noticed in the micro-structure; with larger quantities the Mn constituent is pptd. in dispersed amorphous masses.

H. H. S.

Effect of sulphide on blast furnace slags and cements. R. GRÜN. *Stahl u. Eisen*, **45**, 344-6(1925); *J. Soc. Chem. Ind.*, **44B**, 319(1925).—A fairly high sulphide content in slag, both natural and by addn. of CaS , is not injurious to cements; it increases the strength and does not accelerate setting. When present in small quantity, CaS forms an eutectic with the silicates, is taken up by them into solid soln. at higher temps., and on cooling separates out in dendritic form. When present in larger amt., it assumes globular form.

H. H. S.

The mechanism of setting of calcium sulphate cements. C. L. HADDON. *Trans. Faraday Soc.*, **20**, 337-41(1924).—Theories of the mechanism of setting are examd., and the differences are shown between the hydration processes of plaster of Paris, flooring-plaster, and anhydrite. The varying effect of catalysts is thereby explained. As to cause of expansion, Desch's theory of crystal thrust is favored. Finally the

similarity of the coherence of CaSO_4 cements to that of metals (Rosenhain's theory of an amorphous cement between crystals) is pointed out.

H. H. S.

Ternary systems $\text{CaO-Fe}_2\text{O}_3\text{-CaSO}_4$ and $\text{CaO-Al}_2\text{O}_3\text{-CaSO}_4$. W. H. MACINTIRE AND W. M. SHAW. *Soil Sci.*, **19**, 125-52(1925); *J. Soc. Chem. Ind.*, **44B**, 293(1925).—Newly pptd. Fe and Al oxides adsorb CaO and CaSO_4 to form $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{CaSO}_4 \cdot \text{X} \cdot \text{H}_2\text{O}$. The crystallography of this subs. and of calcium ferrate and aluminate is described, and its bearing on the disintegration of cement embedded in soil is discussed.

H. H. S.

What is alite? HANS KÜHL. *Zement*, **13**, 512(1924).—Because chem. analysis gives high Ca content, K. considers alite to be either an isomorphous mixt. of tricalcium silicate and tricalcium aluminate or a soln. of free CaO in dicalcium silicate and tricalcium aluminate.

(C. A.)

What is alite? OSKAR SCHMIDT. *Zement*, **13**, 543-4(1924).—Since chem. and microscopic analyses of alite crystals show considerable amts. of Al_2O_3 (2-8%), S. concludes that alite is a compd. of tricalcium silicate and a calcium aluminate.

(C. A.)

BOOK

Aide-Memoire de Ceramique industrielle. ALIX CORNILLE. Paris: Revue des Materiaux de Construction, 1924.

Enamels

Bonus system boosts production. ANON. *Ceramic Industry*, **4** [4], 278-80(1925).—The plant and opern. of the Challenge Refrigerator Co. of Grand Haven, Mich., is described.

P. D. H.

Glass

Ford glass methods told in pictures. ANON. *Ceramic Industry*, **4** [4], 274-7(1925).—This is a complete photographic presentation of the world's largest continuous-process plate glass factory. A tank requires 135 tons of flux blocks and 300,000 silica brick, which have a life of from 10 to 14 months. The following batch is fed to the tank every 15 min.

| | | | |
|-----------|----------|----------|----------------------|
| Sand | 385 lbs. | Charcoal | 2 $\frac{1}{4}$ lbs. |
| Limestone | 125 lbs. | Arsenic | 2 $\frac{1}{4}$ lbs. |
| Soda Ash | 120 lbs. | Cullet | 100 lbs. |
| Salt cake | 33 lbs. | | |

The temp. in the tank, melting, is 2600°F, refining, 2225°F, and at the rolls 2050°F. The length of the leer is 442 ft. and the daily production is 40,000 sq. ft. P. D. H.

Conveyors save space in glass plant. ANON. *Ceramic Industry*, **4** [4], 292-4(1925).—The plant of the D. O. Cunningham Glass Co., of Pittsburgh, Pa., is described. The product is flint and green bottles. Gas and oil are used as fuel. The oil is preheated to 200°F. The melting end of the tank is kept at a temp. of 2450°F and the refining chamber at 2200°F. The hot end of the 74 ft.-leer is held at 1025°F. The stack is located at the center. About 9 hrs. are required for the ware to pass through.

P. D. H.

The use of zirconia in glass making. W. E. S. TURNER. *The Pottery Gazette and Glass Trade Review*, **50** [574], 609-10(1925).—This is a report of a paper presented at a meeting of the Society of Glass Technology by T. In a series of glasses in which soda and silica, respectively, were replaced with from 10% to 20% zirconia, very little opacity resulted. In another series containing lime, from 7% to 8% of zirconia failed to produce opacity. When only a small quantity of zirconia was used, it was possible to melt the

glass at 1400°C. With larger amounts the melting was much more difficult and the resulting glasses did not possess the same long working range as glasses containing alumina, which latter type they resembled somewhat. The behavior of the zirconia glasses as regards annealing was similar to alumina-containing glasses. The use of zirconia did not produce glasses of lower thermal expansion, as had been hoped. When zirconia replaced soda, the chemical resist. to water was not as good as when titania replaced soda. When zirconia replaced silica to from 5% to 11% there was a marked improvement in the resist. to alk. solns.

P. D. H.

Sillimanite in the glass industry. ANON. *The Pottery Gazette and Glass Trade Review*, 50 [574], 608-9(1925).—This article is a report of two papers presented at a meeting of the Society of Glass Technology. The first paper, which was presented by Mr. Cousen and Prof. Turner, was entitled "A Study of Sillimanite for the Purpose of the Preparation of Refractory Materials." The most plastic mixts. and those giving in fire clay the most stable and resistant pots were obtained by using sillimanite which had passed through a 100-mesh sieve. Good results were obtained when using 15% to 30% of ball clay as a bond. The porosity of hand-molded specimens was inversely proportional to the amount of bond used and with the addn. of 30% of ball clay reached as low as 22% at 1400°C. The mech. strength, both when 15% and 30% of bond was used, was greater than with fire clay refracs. Bentonite, when used as a bond, although giving the most plastic mixts., proved unsatisfactory in practice. The glasses were superior in color when melted in sillimanite refracs. The second paper, presented by F. G. Clark and W. J. Rees, was entitled "Some Notes on the Use of Sillimanite as a Glass Works Refractory." Tests made under commercial conditions showed that molten glass had very little effect on sillimanite refracs. They were also found to withstand the heat perfectly when used in the exit flues of furns. The best results were obtained with sillimanite bonded with from 10% to 25% of ball clay. The thermal condy. of sillimanite refracs. is higher than that of fire clay. Sillimanite was considered the best refrac. mat. known for use in the hottest part of any glass furn., either in contact, or out of contact, with glass.

P. D. H.

The effect of composition on the viscosity of glass. Part III. S. ENGLISH. *The Pottery Gazette and Glass Trade Review*, 50 [574], 610-1(1925).—This is a report of a paper presented at a meeting of the Society of Glass Technology by E. The effect of magnesia and alumina, respectively, on the viscosity of soda-lime-silica glasses, was studied. The temp. range covered was from 1400°C down to the annealing points of the glass. The progressive substitution of equivalent molecular quantities of magnesia for lime decreased the viscosity until approx. equal mol. quantities of lime and magnesia were present. The effect of further substitution was to increase the viscosity. The rate of setting was distinctly decreased by the substitution of magnesia for lime and was progressive with continued substitutions of magnesia. The substitution of alumina for lime increased the viscosity at the melting temp., whereas in the lower ranges of temp. the viscosity was reduced. The rate of setting was distinctly decreased by the substitution of alumina for lime and, as with magnesia, was progressive with continued substitution.

P. D. H.

The action of barium in glass. ANON. *Keramische Rundschau*, 33 [12], 192.—Translated in the *Glass Industry*, 6 [6], 125(1925).

F. G. J.

Building and bottle glass as well as art glass at the Leipzig exposition. EDITORIAL. *Diamant*, 47 [10], 175(1925).—A description of the exhibition and a list of firms exhibiting.

F. G. J.

Outline for the testing of product at glass works. Issued by the HANDWERKSKAMMER OF UPPER BAVARIA. *Diamant*, 47 [12], 225(1925).—A large number of general and special tests described.

F. G. J.

The development of metal overlay decoration and cutting of glass. OTTO W. PARKERT. *Diamant*, **47** [13], 247(1925).—A short description of the various processes of glass decoration. F. G. J.

The danger from lead in the bottle and ornamental glass painting. F. GREINER. *Diamant*, **47** [13], 242(1925).—Retails the history of lead poisoning, a recognition of the symptoms and the method of cure. F. G. J.

How hot is the tank? S. R. SCHOLÉS. *The Glass Worker*, **44** [36], 13(1925).—Describes various possible errors in pyrometry with thermocouples. Advocates the use of optical pyrometers for checking. F. G. J.

How tank blocks of exact dimensions are made in the factory of the Ohio Valley Clay Co. ANON. *National Glass Budget*, **41** [5], 3(1925).—Description of mfg. process. Blocks are fired in a Dressler tunnel kiln and ground to exact dimensions by carborundum stones. F. G. J.

Raw materials of the glass industry. III. Salt cake and soda ash. I. J. B. KRAK. *The Glass Industry*, **6** [6], 123(1925).—Describes the methods of making salt cake. While it is cheaper than soda ash, it contains a lower per cent of soda, requires more fuel, is more corrosive, and gives poorer color. Salt cake must be reduced or it may float on the molten glass and form "salt" or "gall." F. G. J.

Bottle making in Indo-China. D. ROBERTSON. *The Glass Industry*, **6** [6], 115(1925).—An account of glass mfg. conditions in the far East. F. G. J.

The photo-elastic constants of glass as affected by high temperatures and by lapse of time. F. C. HARRIS. *Sci. Abst.*, **28** [4], 264(1925); *Roy. Soc. Proc.*, **106**, 718-23 (1924).—Filon has previously experimented on the effect of temp. on the photo-elastic constants of glass by the flexure method, enclosing the specimen in a steam jacket giving a maximum temperature of 90°C. He observed a small increase in the stress-optical coefficient for the ray polarized perpendicularly to the line of stress. The present series of experiments now described were carried out with the object of extending the observations for temperatures up to near the melting point. The specimens consisted of small blocks of glass, 4 x 3 x 1 cm., and full experimental details are included. The specimen was observed through a Nicol's prism and a Babinet compensator in the light from a sodium flame polarized by reflection at a single glass plate. With the exception of one glass, which shows a decrease—an extra dense flint containing 64.4% of PbO—the stress-optical coefficient shows an increase with rise of temperature. This exception is in accordance with previous observations that the presence of large quantities of PbO tends to reverse all the known stress-optical properties. In every case examined the value of the stress-optical coefficient has increased with lapse of time. A. F. G.

The advisability of central gas generator for glass and similar plants. DICKE. *Sprechsaal*, **58**, 323-4(1925). H. G. S.

Elastic glass. ANON. *Discovery*, **6**, 151-2(1925).—A purely organic subs., "pollo-pas," made in Austria by F. POLLAK and K. RIPPER, resembles flint glass and is one of the most elastic subs. known. It is composed of carbamide and formaldehyde. It will take dyes selective of definite wave-lengths, and is also suitable for automobile panes, etc. H. H. S.

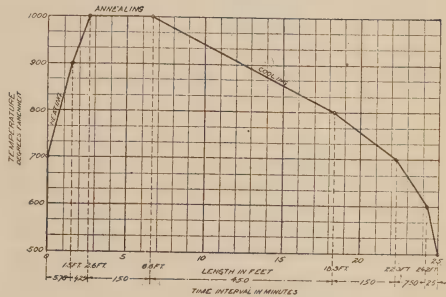
Resistance of laboratory glasses to chemical reagents. D. MIGLIACCI, R. TESTA AND A. SHUNDI. *Ann. Chim. Appl.*, **15**, 87-91(1925); *J. Soc. Chem. Ind.*, **44B**, 317 (1925).—Murano 1922 glass is slightly less resistant to reagents than Jena white mark, and considerably less resistant to change of temp. Thuringian glass is far more readily attacked, and Pyrex, although it offers great resistance to shock and change of temp., succumbs to alkaline solns. Preliminary exposure to steam at 140° renders glass more resistant to chem. attack, and such treatment is recommended for vessels where great accuracy is reqd. H. H. S.

Effect of chemicals on various kinds of glass. C. E. KLAMER. *Chem. Weekblad.*, 22, 140-1(1925); *J. Soc. Chem. Ind.*, 44B, 317(1925).—Tables are given showing loss of wt. of Pyrex, Jena, Sphinx and Murano vessels after heating acids and alkalis in them. The conductivity of distd. water after boiling in selected vessels was detd. Murano and Pyrex are decidedly better than Jena in resisting the action of a mixt. of H_2SO_4 and P_2O_5 .

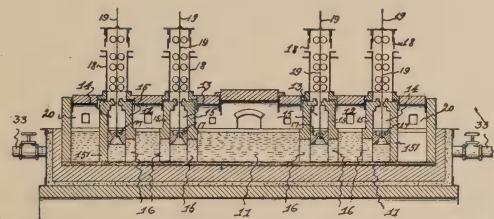
H. H. S.

PATENTS

Process of annealing glass. KENNETH M. HENRY. U. S. 1,540,264, June 2, 1925. The method of annealing glass which consists in first htg. to a temp. less than the maximum annealing temp., maintaining this temp. for a length of time sufficient to partially remove internal stress and strain, cooling rapidly to the lowest annealing temp. of the glass being treated, and thereafter cooling more rapidly to atmospheric temp., whereby the internal stress and strain existing at the end of the htg. stage will be substantially neutralized during the cooling stage. The method of annealing glassware which consists in quickly htg. the glass to a temp. of approx. $1000^{\circ}F$, maintaining this temp. for approx. 15 min. and thereafter cooling the glass at the rate of 6° per min.

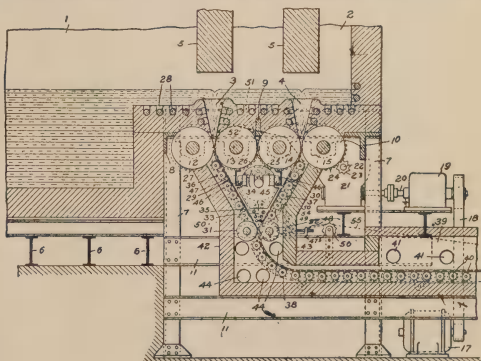


Glass furnace. JULES J. QUERTINMONT. U. S. 1,541,772, June 9, 1925. A glass fur. for drawing continuous sheets of glass, comprising a melting fur., a drawing tank communicating with said melting fur. and divided into a series of alternating drawing and reheating chambers in communication with each other and the melting fur., and terminating with a drawing chamber, a separate and independent htg. chamber adjacent to the end drawing chamber and not in

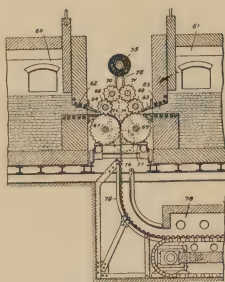


communication with said drawing tank or melting fur. to revitalize the chilled molten glass passing into the end drawing chamber.

Method and apparatus for making wire glass. FREDERICK GELSTHARP. U. S. 1,541,637, June 9, 1925. In combination in app. for forming wire glass, a tank having a pair of parallel outlet slots, a pair of rollers at the exit end of each outlet adapted to receive there between the glass flowing from the outlet, supporting and guiding means in advance of each pair of rollers arranged to bring the two sheets together, means for supplying a metal mesh between the sheets and means for engaging the outer faces of the sheets and pressing them together.

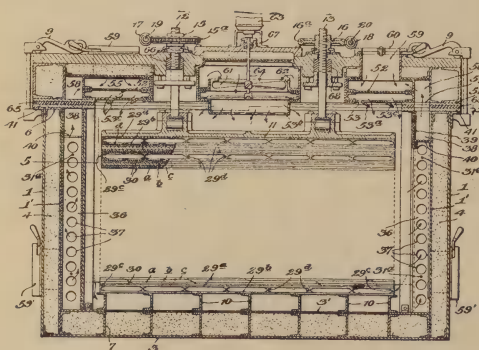


Apparatus for making corrugated wire glass. JOHN H. FOX.



walls below the surface of the glass, a pair of cooled rolls opposite the orifice and spaced apart a distance corresponding to the thickness of the glass sheet to be produced, and with the upper roll spaced away from the tank, and a grid for guiding a wire mesh between the rolls pivotally mounted above the rolls, and having its lower end between the orifice and the rolls and projecting down into the stream of glass passing from the orifice to the pass between the rolls.

Ink for glass. MARK N. FREDENBURGH. U. S. 1,538,890, May 26, 1925. An ink suitable for printing on vitreous articles comprising a metallic oxide decomposable to produce an opaque metallic body, a low fusing point enamel and a vehicle containing only a small amount of residual carbon on decomposition.

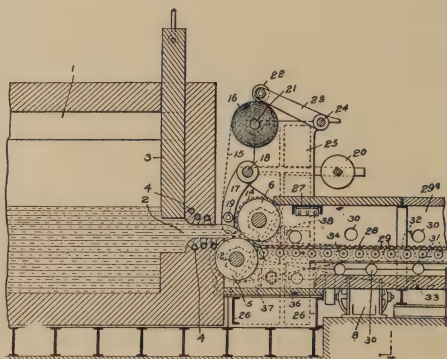


Electrically-heated glass-flow device. JOHN RAU. U. S. 1,539,598, May 26, 1925. In a continuous flow glass feeding trough, having a glass containing chamber therein, a high temp. relatively non-disintegrating elec. hgt. means extending across the chamber and above the glass for directly hgt. the same to high temps.

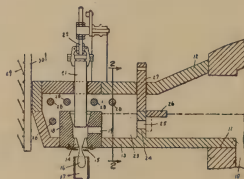
Glass-gathering apparatus. WILLIAM WESTBURY.

U. S. 1,541,635, June 9, 1925. A process of making wire glass which consists in continuously flowing two ribbons of glass so that they converge and meet, corrugating the sheets during such movement, continuously corrugating a wire mesh, feeding it between the two ribbons as they meet and applying press. to the outer faces of the ribbons to cause them to weld.

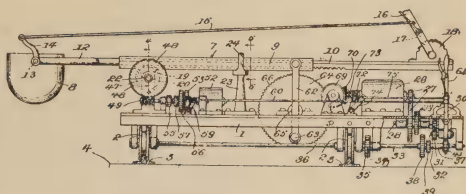
Method and apparatus for making wire glass. FREDERICK GELSTHARP. U. S. 1,541,638, June 9, 1925. App. for forming sheet glass comprising a tank containing a bath of molten glass and having an orifice leading through one of its side



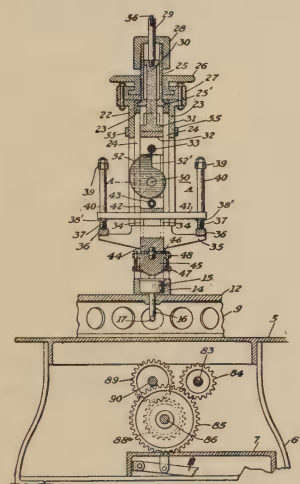
Apparatus for making reinforced glass. WILLIAM C. BULL. U. S. 1,539,239, May 26, 1925. An app. for fabricating reinforced glass including an oven-chamber, means for sealing a press therein for the glass product, means for supplying dry heat to the chamber while the glass product is under press. and means for exhausting air during the dry heat and press. period and for causing circulation of the heated air currents during the final stage of the dry heat and press. period.



U. S. 1,539,707, May 26, 1925. In a gatherer of the character described, the combination of a carriage, a vertically tilting arm mounted on the carriage and comprising telescopic sections, one of said sections being pivotally connected with the carriage at a point between its ends and the other slidably engaging said pivoted section, said slidable section having rack teeth, a ladle carried by the sliding arm section, means including a gear mounted concentric with said pivotal connection and meshing with the rack teeth for sliding said sliding arm section in or out to advance or retract the ladle, and means coupled to said pivotally mounted arm section for tilting said arm in a vertical plane.

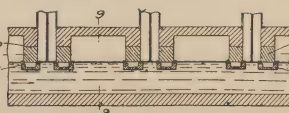


Machine for forming glass articles. CHARLES H. R. HOWE. U. S. 1,539,842, June 2, 1925. A mach. for forming glass articles comprising a supporting structure, a rotatable mold carrying table thereon, an annular series of molds on the table, means for intermittently rotating the table through a limited arc, a vertically reciprocable press cooperating with the molds for forming the articles as the molds are brought successively under the press, a rotatable cam and means engaging the cam for raising and lowering the press, said cam being so arranged as to enable the press to be lowered independently thereof when the cam is in a certain predetermined position. The combination with a glass article forming mach. comprising a supporting frame on which is mounted a rotatable table, a series of molds having vertically movable center portions on the table, means for intermittently rotating the table, a press cooperating with the molds, means for raising the central parts of the molds above



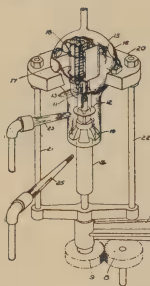
the other parts after they have passed the press, of a rotating stripping means adapted to swing over the molds when the central parts are elevated having a pair of pivoted depending jaws on said stripping means for gripping the opposite edge of an article on said elevated mold and removing it therefrom.

Furnace for use in the manufacture of sheet glass by vertical drawing. ERNEST DELACUVELLERIE. U. S. 1,541,906, June 16, 1925. An improvement in fur. for use in the manuf. of glass sheets by vertical drawing and consisting essentially in the addition of a homogeneous piece of refrac. mat. of suitable section which is placed directly under the bridge pieces proper which exist in this type of fur., the injurious corrosion of the joints of the usual bridge pieces being avoided and the particles or grains which become detached from the walls collecting on the said under additional pieces, the replacement of which additional pieces being effected without complete stoppage of the fur. and their protection assures perfect manuf. of the glass sheet without striations or cords.



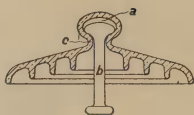
Plunger-operating mechanism for glass furnaces. THOMAS STENHOUSE. U. S. 1,542,013, June 16, 1925. A glass fur. including a flow

spout, a plunger adapted to reciprocate in said flow spout, means for reciprocating the plunger, and fluid press. operated means for lifting the plunger clear of the flow spout.



Glass working machine. JOSEPH BRANIGAN. U. S. 1,542,365, June 16, 1925. A mach. for sealing a stem in a bulb comprising a support for the stem, a support for the bulb, means mounted on said support for the stem, and surrounded by the bulb for maintaining the bulb in the desired relation to the stem, said means having a discontinuous surface whereby heat may be applied to the stem.

Method of making suspension insulators of glass. ERICH SCHOTT. U. S. 1,542,588, June 16, 1925. Method of making suspension insulators of glass, consisting in this that a glass body is first shaped in such a way as to receive a hollow space, adapted to receive a clapper, that thereupon a clapper is inserted and finally the glass is pressed round the clapper, so that after the hardening of the glass the said clapper cannot be pulled out from the said hollow space.

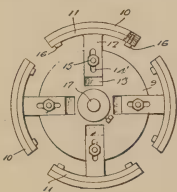


Heavy Clay Products

Preventing rust on drier cars. E. BUSS. *Sprechsaal*, 58, 328-9(1925).—B. used mixts. of a silicate, cement, sand and clay to paint the Fe on drier cars and thus protect them from rusting. The silicate employed contained 65.54% SiO_2 , 15.85% Al_2O_3 and 10.91% H_2O . One mixt. consisted of 85 cement, 9 silicate, and 6 clay. Another mixt. consisted of 1 cement, 2.5 sand, and a certain amount of silicate. H. G. S.

PATENT

Brickmaking machine. KENNETH G. McMILLAN. U. S. 1,541,429, June 9, 1925. In a brick printing mach., the combination of a traveling clay bar from which the bricks are adapted to be cut, a printing member comprising a rotary carriage and a plurality of circumferentially arranged printing plates, the circumference of the printing member being predetermined to equal exactly the length of the bar necessary to produce bricks equal in number to the number of printing plates on the carrier and said plates being adjustable relatively to one another to vary the circumference of the printing member to compensate for variation in the length of bricks cut from the bar and means for utilizing the travelling movement of the bar to drive said printing member at a rate of speed equal to the speed travel of the bar.



Refractories

British comments on lime kiln refractories. ALFRED B. SEARLE. *Rock Products*, 28 [11], 49-50(1924).—The chief actions to which the refractory lining of a lime kiln is subjected are: (1) abrasion of descending charge of stone and lime; (2) sudden changes of temp.; (3) chem. action of the fuel; (4) chemical action of the lime. Paving bricks, hard fine textured fire bricks, granite and steel plate are used in the uppermost 6 ft. zone. In the fire zone high alumina fire brick are most satisfactory, in resisting the chemical action of the lime. Silica brick although used are not satisfactory. Magnesite brick do not withstand the temperature changes nor the resistance to abrasion. Rammed and tamped linings are not durable. Blocks are preferable to brick as there are

fewer joints. Insulation of a kiln saves fuel but increases the temperature of the inside wall thus necessitating a higher temp. refractory in the hot portion of the kiln.

H. G. F.

Dolomite as refractory material. T. N. LESLIE. *South African Jour. of Sci.*, **21**, 159(1924).—The object of this note is to call attention to the Transvaal dolomite as an economic factor in the development of industry in S. A., more particularly as a refractory material. Dolomite occurs over a great part of the Transvaal. Many analyses have shown nearly every gradation of the 3 first named between:

| | | | |
|-------------------------|-------|-----|-------|
| CaCO ₃ | 54.46 | and | 9.07 |
| MgCO ₃ | 44.23 | and | 3.01 |
| SiO ₂ | 0.69 | and | 62.16 |

O. P. R. O.

Silica (New South Wales). L. F. HARPER. *Geol. Surv. Bull.*, **10**(1924).—Known deposits of material in New South Wales suitable for the manuf. of silica bricks are 2 types, and although analyses of bricks made from each of the 2 types of deposits are practically the same, the reactions to firing are very different. Bricks made from the Ulladulla deposits will *not* stand variations in temp., but they are said to be equal, if not superior, to any other silica brick for steel furnace works. The bricks made from the Marrangaroo quartzite are most suitable for furnaces at glass works, gas works, and other places where brick is subjected to var. in temp. It appears that New South Wales has silica suitable for manuf. of high-grade silica bricks adapted to all requirements.

O. P. R. O.

Corrosion of fire brick, silica brick, and magnesite brick, by furnace slags. J. PRELLER AND V. KORBER. *Chem. Listy*, **19**, 48–51(1925); *Jour. Soc. Chem. Ind.*, **44B**, 326(1925).—Basic slags corrode magnesite brick less than fire brick or silica brick, and the action is the less, the smaller the periclase crystals, the denser the brick, the smaller the SiO₂ content, and the slower it is cooled. SiO₂ favors formation of olivine, and this reduces the softening pt. of the brick.

H. H. S.

Staining process for testing refractory materials. E. STEINHOFF AND F. HARTMANN. *Stahl u. Eisen*, **45**, 337–43(1925); *Jour. Soc. Chem. Ind.*, **44B**, 317–8(1925).—Staining after etching, well-known in petrology, is applied to refractories. The etching soln. consists of equal pts. concd. HCl and satd. AlCl₃. The gelatinized ingredients are stained with methylene blue. Clay fired up to 1000° is stained deep blue; at 1100°, light blue; at 1200° scarcely colored; and at 1300° colorless. Quartz unmodified by the treatment is colorless, while quartz modified is sky-blue. Clay-lime and clay-MgO zones are stained dark-blue, but they may be distinguished by staining with anthrapurpurin, which gives a typical red-brown with CaO ingredients. The staining test thus supplies data on: the temp. of burnt clays and clay-grog brick; the occurrence, distribution and degree of modification of quartz; localized CaO and MgO fusions; presence and position of thin layers of kaolin in quartzites; extent of modification in silica brick; and behavior of silicate fusions.

H. H. S.

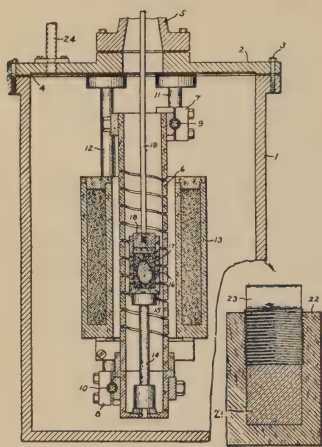
Attack of fire brick by combustion products. D. J. VAN WIJIK, JR. *Chem. Weekblad*, **22**, 16–8(1925).—The principal factor in the corrosion of refractory material of a furnace is the ash of the fire; high Fe or Al content of the fuel is particularly objectionable. Good fire brick should have an Al₂O₃/SiO₂ ratio as near to 71/29 (mullite, 3Al₂O₃·2SiO₂, according to Bowen and Greig), as practically possible, low Fe, Na, K and Ca content and low porosity.

(C. A.)

PATENTS

Process of manufacturing heat-insulating brick. RICHARD C. WILLIAMS. U. S. 1,540,509, June 2, 1925. That method of mfg. heat insulating refrac. bricks and the like which consists in mixing together diatomaceous earth, a combustible coking

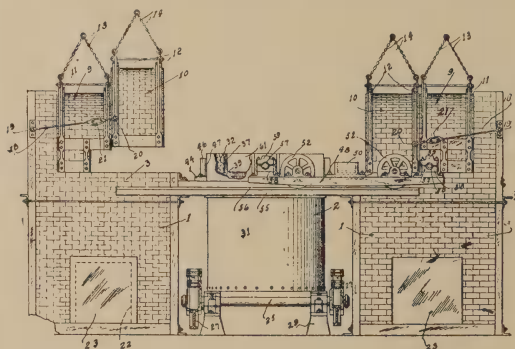
binder and water, the quantity of diatomaceous earth being at least equal to the combined quantities of binder and water, molding the mixt. and exposing the molded mixt. to a heat sufficient to primarily drive off the volatile matter, next to coke the binder and finally to burn out the binder and effect sintering of the silica.



a drawing fur. located between the draining furs., a truck supported for travel between the draining furs. and with relation to the drawing fur., the truck including side sills spaced to span the respective draining furs. when the truck is at one or the other limit of its travel, bearings upon the sills, and pots having trunnions journaled in the bearings, the said bearings being of trough-like form whereby to contain a cooling fluid.

Process of making vitreous silica. LEVI B. MILLER. U. S. 1,541,584, June 9, 1925. The method of producing clear vitreous silica or quartz glass which consists in htg. quartz in the crystal state to a fusing temp. in a vacuum while mechanically supporting said quartz to prevent displacement of particles resulting from the cracking of said quartz when heated to a temp. of about 550°C.

Glass apparatus. ROBERT W. HILTON. U. S. 1,541,142, June 9, 1925. An app. of the class described, spaced draining furnaces open at their relatively adjacent sides, means for closing each fur.,



Whiteware

Manufacture of chemical apparatus from porcelain. E. MOSER. *Chem. App.* 12, 73-4(1925).—Apparatus usually made of chem. stoneware can be made of porcelain, which has the advantage of lighter weight and longer life. Illustrations are given of stills, pumps, and large contg.-vessels. They are said to stand a press. of 1376 kg. per sq. in., to have a modulus of elasticity of 8280 kg. per sq. mm., a spec. ht. 0.221, coeff. of expansion 0.0000038, m. p. 1670°, and softening pt. 1400°C. H. H. S.

Changes in porcelain in tunnel-kiln. E. KEMPCKE. *Keramos*, 3, 551-7(1924); *J. Soc. Chem. Ind.*, 44B, 318(1925).—Samples were taken from a tunnel-kiln after having been fired for periods varying from 22½ to 31¼ hrs. at temps. varying from 1050° to 1420° in intervals of 25° to 60°. The course of porcelain formation, the interaction of the raw materials with each other, and the changes in porcelain structure were examined microscopically. The color and hardness of the body and glaze, the fracture, porosity and true and apparent d. were also detd. Between 1050° and 1160° the products were "dry" and non-translucent, like earthenware. Sintering began at 1180°, and at 1230° the ware was almost porcelainic. Formation of porcelain, with soln. of quartz and crystal formation, reached its max. at 1420°. H. H. S.

Ceramics at the Bureau of Standards. ANON. *Chem. Met. Eng.*, **10**, 423-5 (1925).—Describes the investigations at the Bureau in 1924, in the field of pottery. The work was mainly on specifications for vitrified tableware, and thermocouple protection tubes in glass furnaces.

M. E. M.

Progressive porcelain plant producers' profits. ANON. *Ceramic Industry*, **4** [4], 287-90(1925).—This article contains a description of the plant and opern. of the Federal Porcelain Co., of Carey, Ohio. The plant is also well described pictorially. The product is low tension elec. insulators, which are made both by the dry press and plastic process. The clays are weighed on a scale car, blunged for 4 hrs., sieved, and filter pressed in 1 hr. and 15 mins. under a press. of 140 lbs. per sq. in. The ware is dried in humidity driers and fired to 2600°F in 30 hrs. in down-draft periodic kilns. The sagger clay is thoroughly weathered by keeping it sprayed with water for a considerable length of time. The sagers are mach. made and dried at 150°F for 12 hrs. The life of the sagger is 6 firings.

P. D. H.

Sulphur models for molding ceramic molds. E. MOTSCHMANN. *Sprechsaal*, **58**, 323 (1925).—Sulphur models for making plaster molds offer advantages in some cases over plaster models. It cannot be used for models which require finishing and is best adapted to small models which are cast in 2-piece molds. In making a model of S the original shape is first molded with clay and then the mother mold is cast about this similar to the method employed for plaster models. The inside of the plaster mold is carefully finished and is coated with an oil instead of shellac. Three-fifths old S is mixed with $\frac{2}{5}$ new S and the mixt. is melted in an Fe pot. When the S has become thoroughly melted about $\frac{1}{3}$ Fe filings or Fe scale are added. The molten S is then poured in the plaster mold where it is allowed to remain until it has become thoroughly solidified. In casting a plaster mold from this S model it is covered with a fatty oil contg. some petroleum. S models are much more durable than plaster models and also have the advantage in that the old models may be remelted and used over again while plaster models cannot be used again.

H. G. S.

Testing and research fields of high tension insulators. ANON. *Sprechsaal*, **58**, 322-3(1925).

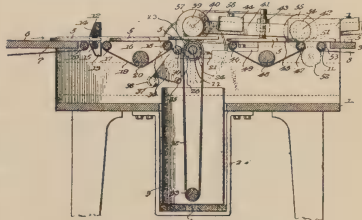
H. G. S.

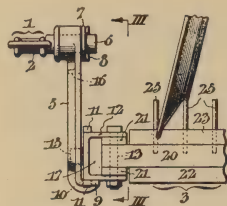
Insulating materials. K. G. MAXWELL AND ALLAN MONKHOUSE. *Quarry and Surveyors' and Contractors' Jour.*, **30**, 123(1925).—A paper given before the Institution of Electrical Engineers (England) reviewing recent developments in the manuf. of insulating materials, with data obtained by the test methods as adopted by the Elec. Research Assn. including tables showing properties of the principal insulating mats. The following gives the elec. strength in V/mil. of various fireproof and refrac. materials: porcelain (wet method), 150-200; porcelain (dry method), 80-120; marble, 40-80; slate, 5-20; heavily spotted green mica, 1100; medium spotted green mica, 1200; medium spotted brown mica, 2000; clear ruby mica, 2250; clear brown mica, 3500; Canadian amber mica, 3800; clear white (Muscovite), 3000; Port. cement and asbestos molded compositions, 5-50 (at 20°C).

O. P. R. O.

PATENTS

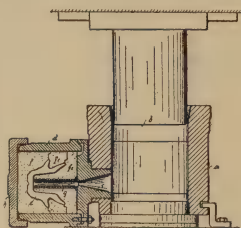
Glaze machine. JOHN B. OWENS. U. S. 1,540,417, June 2, 1925. In a mach. for glazing tiles, the combination with means for applying the glaze to the tiles, of an endless apron for delivering the tiles to said glazing means, means for cleaning the tiles before they pass to the endless apron, and another endless apron to which the glazing means delivers the tiles after they have been glazed, said last named apron removing the glazed tiles.





Device for supporting chinaware or the like during the process of manufacture. THOMAS ALLSOP. U. S. 1,539,808, May 26, 1925. In an app. of the character described a reversible tray adapted to support the articles to be dried in either of its positions, said tray being provided with means for supporting said articles on edge.

Process for the production of ceramic ware. RICHARD SPRENGER. U. S. 1,541,869, June 16, 1925. A process for the manuf. of ware from ceram. mat. and especially porcelain, consisting in applying press. upon a mass of ceram. mat. within a container while the said mat. is in a plastic and non-fluid condition, extruding thereby a portion of the said mass from the container through an inlet into a mold, which inlet extends through a part of the mold into a position when the extended mat. is distributed to fill the molding space, substantially as described.



Equipment and Apparatus

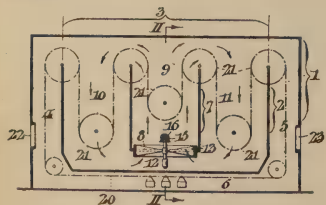
An optical pyrometer. IAN STEWART. *Chem. Eng. Mining Rev.*, 17, 275-6 (1925).—Describes a new radiation pyrometer in use in Australia. The instrument is self-contained, fits in the hand, and is used like a telescope. M. E. M.

Apparatus for measuring the warpage of tank and floor tile. O. KALLAUNER. *Sprechsaal*, 58, 321-2 (1925).—K. describes an apparatus for measuring the warpage on square tile. The tile are set on a square table which is carefully leveled and the warpage at any portion of the tile is measured by means of a needle. H. G. S.

Electric power in the brick industry. T. R. C. FLINT. *Contract Rec. and Eng. Rev.*, 39, 385 (1925).—The advantages of electricity in the operation of a brick plant and the power required for various processes were discussed in an address by F. of the Toronto Hydro-Elec. System before the Sand-Lime Brick Assn. in which he points out that the use of electric power split up into one and more units, the proprietor of the plant is able to take advantage of the diversity factor in the load and thus cut down power costs as compared with a steam engine installation. If for any reason central station power is not available, very efficient and compact generating stations can be installed. A number of brick plants have installed steam driven elec. plants in order that the flexible elec. motor drive may be used. O. P. R. O.

Thermostats for very high temperatures. LEASON H. ADAMS. *J. Optical Soc. Am.*, 9, 599-603 (1924).—The heating coil of the elec. fur. forms one coil of a wheat-stone bridge. Changes in temp. unbalance the bridge and actuate a current controlling mechanism of which a description is given. D. E. S.

A centrifugal pump for handling liquids carrying hard, abrasive materials. T. HOFFMANN. *Chem. App.*, 12, 62-3 (1925); 2 cuts.—The housing has a renewable steel lining. (C. A.)

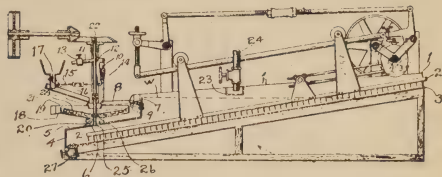


PATENTS

Apparatus for drying or otherwise treating manufactures. THOMAS ALLSOP AND WALTER W. SIBSON. U. S. 1,539,807, May 26, 1925. App. of the character described comprising an enclosure; a U partition therein; and radiators within said partition.

Closed-circuit classifier. ROLLAND S. TROTT. U. S. 1,541,237, June 9, 1925. A classifier unit,

comprising in combination, a thickener and a classifier, each provided with an overflow, the classifier having an outlet above its liquid level, a device for moving settled mat. to said outlet and an aperture below its liquid level, the thickener having a bottom surface adapted to receive settling mat., and being provided with a discharge orifice and with a device for moving settled mat. toward said orifice, means joining the thickener and the classifier so that said orifice registers with said aperture, means for feeding mat. to the thickener, means for feeding a liquid to the classifier, and means for conveying the overflow from the classifier to the thickener.



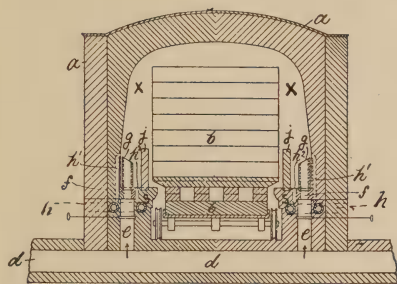
Kilns, Furnaces, Fuel and Combustion

Fuel economy obtained by air preheating. MARCEL ESBRAN. *Tech. moderne*, 17, 235-6(1925).—A mathematical discussion showing that by preheating the air used for combustion, a given temp. can be maintained in the furnace with a decrease in fuel consumption equal to about 7% for an increase of 150° in the temp. of the air and for 1400-1500° in the furnace. (C. A.)

PATENTS

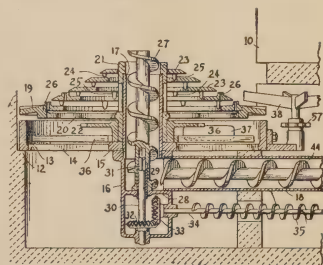
Gas-fired oven or kiln. JOHN HENRY

MARLOW. U. S. 1,541,647, June 9, 1925. In a tunnel kiln, means for htg. the same by gaseous fuel, comprising a transverse flue which is connected with a gas supply, gas supply openings between the flue and vertical burner tubes which communicate with the gas supply, ways having outlet openings on different horizontal planes for supplying air about the burner tubes, and a wall which extends vertically above the open upper ends of the burner tubes.

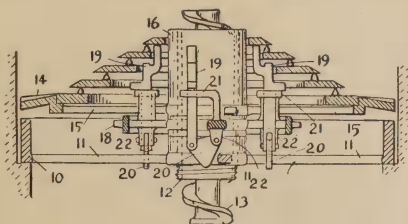


Furnace. JOHN D. MARTIN. U. S. 1,541,648, June 9, 1925. In a fur. a conical grate, an underlying ash-ring, a scraper with radiating arms for removing ashes from the ash-ring, and means for revolving the ash-ring and the scraper.

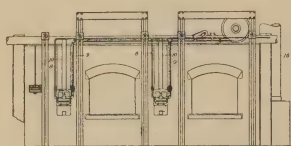
Furnace grate. JOHN D. MARTIN. U. S. 1,541,649, June 9, 1925. In a fur. a conical grate consisting of a series of super-



imposed rings, means for revolving the grate, lifting elements carried with the revolving grate for separating the rings, and stationary elements which are engaged by the lifting elements.



Furnace. CLARENCE E. HAWKE and BOYD M. JOHNSON. U. S. 1,542,552, June 16, 1925. A fur. comprising a htg. chamber having a combustion chamber associated



therewith, a pre-heating chamber, a pair of flues beneath the floor of said pre-heating chamber and each having its top wall formed thereby, said top walls having openings therein establishing communication between said flues and pre-heating chamber, and means for conducting the waste gases from said combustion chamber to one of said flues and for conducting them from the other of said flues out of the fur., substantially as described.

Geology

Cryolite (Greenland). ANON. *Indus. Australian & Min. Stand.*, **23**, 162(1925).—The world's only cryolite quarry. Cryolite occurs in commercial quantities only in Greenland, at Ivigtut. It is mined in a great open cut, the vertical walls of which stand remarkably well. Air drills are used, and the cryolite is shot with black powder down in benches from the top, the effort being to shatter the product as little as possible. Three classes are produced, one for the U. S., the black (dark brownish-grey translucent) cryolite, which contains approx. 93% of cryolite; and two for Denmark, both white, said to be 95% and 99% pure. Of the cryolite shipped to the U. S. the greater part is now used as a flux in the metallurgy of aluminium and for opaque glass. In aluminium metallurgy the mineral is rapidly being supplanted by artificial cryolite.

O. P. R. O.

Graphite deposits of Ashland, Alabama. J. S. BROWN. *Econ. Geol.*, **20**, 208-48 (1925).

H. H. S.

The chemical composition of the earth. H. S. WASHINGTON. *Amer. J. Sci.*, **9**, 351-78(1925).—The composition of the whole earth, core and crust, is: Fe (Metal) 31.82%, Fe (Silicate) 7.94, O 27.71, Si 14.53, Mg 8.69, Ni (Metal) 3.16, Ca 2.52, Al 1.79, S 0.64, Na 0.39, Co (metal) 0.23, Cr 0.20, K 0.14, P 0.11, Mn 0.07, C 0.04, Ti 0.02%. Goldschmidt's Sulphur-oxide intermediate Zone is not accepted. From the core upward the shells are called lithosporic, ferrospheric, peridotite, basaltic, and granitic.

H. H. S.

Phosphate deposits of the Pacific. F. D. POWER. *Econ. Geol.*, **20**, 266-81(1925).

H. H. S.

Occurrence of diaspor in the Transvaal on Mooikopje, 58, Middleburg. A. W. ROGERS. *Trans. Geol. Soc. S. Africa*, **27**, 71-5(1924).—Analyses of kaolinite and diaspor are given.

(C. A.)

BOOK

Engineering Geology. H. RIES AND T. L. WATSON. 697 pp. 253 figs. New York: John Wiley & Sons, 1925. \$5.00.

Chemistry and Physics

A method of preparing thin sections of friable rocks. CLARENCE S. ROSS. *Amer. Jour. Sci.*, **6**, 483-5(1924).—On heating bakelite varnish a transformation takes place producing bakelite. By impregnating friable rocks and mats. such as bentonite or clay with bakelite thin sections can readily be prepared of such mats. The most practical method of impregnating is to soak the specimen in the varnish, allowing the varnish to fill the pores by capillary attraction. Bakelite varnish is soluble in alcohol and ether, with which it may be diluted in order to make it penetrate more readily into fine pores. After soaking the fragment it is heated one or two days at from 70° to 90° in order to transform the varnish to bakelite. Bakelite is not softened by heat. To avoid the formation of bubbles the varnish may be heated to drive off a portion of the volatile

matter, but not to hardness. This pre-heated mat. is superior for use as a cement. The index of refraction of bakelite is 1.634. In mounting friable rocks it is suggested to impregnate the rock with bakelite, and after grinding down one face to mount the specimen to the slide with balsam, using balsam for the cover slip. The high index of bakelite makes it desirable as an imbedding medium for certain mats. that have a high indices of refraction.

H. G. F.

Equations of state of the plastic phase of a natural isotropic solid. M. BRILLOUIN. *Sci. Abst.*, **28** [4], 263(1925); *Compt. Rend.*, **179**, 1563-6(1924).—The solids commonly termed malleable or ductile present two phases according to the forces exerted upon them, *viz.*, an elastic one with sensibly reversible properties, and a plastic phase. The author now develops a theory for the latter analogous to the theory of elasticity. He questions the validity of the isotropic theory and substitutes one which is in best accord with observations, *viz.*, that the plastic phase is characterized by the fact that only one of the six elements of deformation is free to increase indefinitely, while the other five continue to be determined by elastic conditions. If the unique deformation does not produce a change of density, the phase is plastic, otherwise it is brittle. Based on this hypothesis, equations of state are derived which characterize the plastic state and rectify the equations of Levy derived from the old hypothesis.

A. F. G.

Ring method of measuring surface tension. P. E. KLOPSTEG. *Sci. Abst.*, **28** [4], 260(1925); *Science*, **60**, 319-20(1924).—The author points out that the values given for the surface tension of water measured by the ring method are on the average 3.2 dynes per cm. greater than the mean value given by other methods. Fahrenwald's explanation of this difference is discussed, and shown to be probably incorrect. The author considers that the error was probably a systematic one, due to some faulty technique, and the following explanation is suggested: As the ring is drawn out of the liquid, the upward force on the ring, measured by the torsion of the wire, is just balanced by the weight of the liquid elevated above the normal surface. It is important to note that the scale readings of the instrument are taken with reference to the scale zero, and that the scale zero corresponds with the actual zero of torsion only when the arm which carried the ring is in its position of zero balance. As the ring is pulled higher with increasing force, the true zero on the scale, with reference to which reading should be taken, shifts upward from the scale zero by an amount which corresponds to the position of the arm. Consequently, at the instant the film ruptures, the scale reading will be too high. A new technique has been devised whereby the vessel containing the liquid is gradually lowered, by means of the screw adjustment on the support, while the increasing force is being applied, all the while maintaining the arm in its position of zero balance. Experiments to test this explanation have shown a difference of 3.3 dynes per cm. for water when the old technique and the new technique, respectively, were employed.

A. F. G.

Note on the viscosity measurement of ceramic bodies. O. KRAUSE. *Sprechsaal*, **58**, 230(1925).—K. discusses the advantages and disadvantages of the Fischer Bauer ball viscosimeter. K. obtained good results for plant control work by using a 200 cc.-pipette for measuring the viscosity of clays by the flow method which gives comparable results but does not give the actual viscosity of the slip.

H. G. S.

Silicate solutions and some siliceous gels. J. G. VAIL. *Jour. Soc. Chem. Ind.*, **44**, 214-9T(1925).—Soluble silicates have in recent years assumed a steadily increasing importance in industry. Films of gel, formed in hot water supply systems by introducing small amts. of sodium silicate of a type high in SiO_2 , prevent corrosion of metal piping. Plumbo-solvent-moorland waters, treated with 5 pts. per 10^6 of SiO_2 as sol. silicate, are changed from a menace to health to a condition of safety. Dry batteries made from Zn which had been cleaned with silicate soln. corrode more evenly in service than the

same metal cleared with other alk. solns. Films on metal coats are the best foundation for paint coats. The cause of film formation has not been fully explained, but it is noted that negatively charged colloidal particles of SiO_2 are capable of absorbing $+$ ions upon their surface, and that at each surface where film is formed positively charged metallic ions are known to exist. Commercial sodium silicate solns. contain 1.5–4.2 mols. SiO_2 for each Na_2O ; they are regarded as contg. the more or less dissociated metasilicate, Na_2SiO_3 , and colloidal SiO_2 . Anything which tends to remove the Na ions from its relation to the SiO_2 particles will induce gelation, e. g., CO_2 , acid salts, alcohol, NH_3 . The industrial use of silicate depends on this fact.

H. H. S.

The scratch test for hardness. G. A. SHIRES. *Engineering*, **119**, 557(1925).—A sclerometer consisting of a diamond with a load of 50 g. was compared with the Brinell test for steels. The relation is as follows:

| Width of scratch in μ | Brinell hardness | Width of scratch in μ | Brinell hardness |
|---------------------------|------------------|---------------------------|------------------|
| 29 | 203 | 22 | 430 |
| 28 | 230 | 21.5 | 453 |
| 27 | 240 | 21 | 494 |
| 24.5 | 320 | 20.5 | 517 |
| 24 | 346 | 20 | 585 |
| 23.5 | 363 | 19.5 | 625 |
| | | 19 | 653 |

H. H. S.

Action of fluxes on ceramic raw materials. K. G. VERSHOFEN. *Keramos*, **3**, 451(1924); *J. Soc. Chem. Ind.*, **44B**, 318(1925).—Of the 4 chief raw materials, clay, kaolin, feldspar and quartz, quartz was the only one really attacked at 1000° by basic Ca, Mg and Na compds. and by soluble fluorides. The action on quartz depended on its fineness.

H. H. S.

Reactions of chromates at high temperatures. M. R. NAYAR, H. E. WATSON, AND J. J. SUDBOROUGH. *J. Indian Inst. Sci.*, **7**, 53–70(1924).— CaCrO_4 gives off O at 1000° . Addn. of CaO lowers temp. of decompn., 0.1 mol. CaO lowering it to 800° but decompn. is not complete even at 1300° . There is no evidence of the formation of definite compds.; a series of solid solns. appears to be formed. If the same molecular mixts. as above are made up from CaO and Cr_2O_3 the same per cent chromate is obtd. at each temp., chromate formation beginning at 600° and proceeding more rapidly with excess CaO. Na_2CrO_4 may be heated to 1000° without decompn.; MgCrO_4 is almost completely decomposed at 650° yielding chromites. Na_2CrO_4 can be made almost quantitatively from Na_2CO_3 and Cr_2O_3 in 4 hrs. at 755° ; MgCrO_4 is formed very slowly from MgO and Cr_2O_3 at temps. below 600° .

H. H. S.

Studies in the mica group. A. N. WINCHELL. *Amer. J. Sci.*, **9**, 309–27, 415–30 (1925).—The theory that valence determines what elements can take the place of others in an isomorphous series of crystals of complex compn. is discarded. So long as all valences are satisfied in each mol., one element can replace another if the atoms are similar in volume. In micas, as in other silicates, each crystal is an aggregate of several intergrown space-lattices which differ decidedly in the size of their atoms. Micas are not orthosilicates, nor metasilicates, nor any other single type of silicate. There are two classes of micas, one characterized by 7 atoms (excluding O, H and F), and the other by 8 atoms. The first class, named heptaphyllite, contains muscovite KAl_3Si_3 , polyolithionite KLi_3Si_3 , phengite KAl_2Si_4 , protolithionite $\text{KFe}_{1.5}\text{Al}_2\text{Si}_{2.5}$; and micas contg. more than one of these mols., e. g., lepidolite, which is $\text{Mus}_{50}\text{Pol}_{50}$, Zinnwaldite $\text{Lep}_{60}\text{Pro}_{50}$, and mariposite $\text{Phe}_{50}\text{Pro}_{50}$. The class contg. 8 atoms is named octophyllite and consists of the biotite group. The variations imply the existence of 4 chief mols.: phlogopite

KMg₃AlSi₃, eastonite K₂Mg₅Al₄Si₅, siderophyllite K₂Fe₃Al₄Si₅, and annite KFe₃AlSi₃. Haughtonite is $\text{E}_{85}\text{Sd}_{50}$. In general, octophyllite is dark and heptaphyllite light-colored, but this distinction is not reliable. Several black micas have been called biotite which are heptaphyllite, while colorless mica may be octophyllite. H. H. S.

Density, porosity and occluded gases of clays, kaolins and light silicas. A. BIGOT. *Compt. rend.*, **180**, 666–8(1925).—The origin of diatomaceous earth and infusorial earth is known but that of the globular SiO₂ is not. An infusorial earth of Oullis (a) and a globular SiO₂ of Mesnes (b) contained, resp., SiO₂ 88.30, 87.95; Al₂O₃ 0.99, 3.10; Fe₂O₃ 1.01, 1.05; CaO 0.30, 0.10; MgO 0.07, 0.90; P₂O₅ 0.01, —; loss on ignition 8.80, 6.80%. The SiO₂, purified by levigation, gave a soft mass, that from (a) having an apparent d. of 0.61 and that from (b) 0.72. The powd. materials themselves showed great differences in apparent d. (a) 0.160 and (b) 0.425. There is no relation between chem. compn. and apparent d. Subjecting a powd. sample of (a) to a pressure of 100 kg. per sq. cm. and evacuating to 2 mm. Hg drives out most of the air, which is absorbed again when the pressure and vacuum are removed. Absolute d. is detd. in a sp. gr. bottle, with petroleum for liquid. The sample is first dried for 2 hrs. at 120°. It takes 1–2 days for all bubbles to be removed by the vacuum. Absolute d. of (a) is 2.32. The powder whose apparent d. was 0.160 contained 6.89% SiO₂ and 93.11% gas. The sample whose apparent d. was 0.61 contained 26.29% SiO₂ and 73.71% gas. A sample of 100 cc. of soft paste of (a) weighed 130 g. and lost 65 g. in drying. This sample, then in the soft state, contained 65 cc. of H₂O and 28 cc. of SiO₂, leaving 7 cc. (or 7%) of air. Clays and kaolins show the same properties in varying degrees. The proportion of occluded gas in clays decreases as the colloidal plasticity increases. The methods have been applied also to a number of rocks, glasses, porcelains and other materials often considered impermeable. (C. A.)

The effect of gases on silicates. HANS V. WARTENBERG. *Z. anorg. allgem. Chem.*, **142**, 335–6(1925).—Quartz-glass and porcelain are attacked by H at temps. of 1200° and above with formation of Si vapors, which under certain conditions condense to brown Si (C. A., **7**, 1451). In the presence of metals the Si is dissolved. H₂O seems to react with the FeO of the porcelain at 1200° as O disappears (Nernst and v. Wartenberg, *Z. physik. Chem.*, **1905**, 535). Cl reacts with the Fe₂SiO₄ of the porcelain at 600° with the formation of FeCl₃. (C. A.)

The entrainment of magnesium by calcium oxalate. LEMARCHAND. *Compt. rend.*, **180**, 745–8(1925).—As a result of some 134 analyses it is shown that the presence of MgC₂O₄ in a ppt. of CaC₂O₄ is the result of 2 factors. (1) In a soln. which is not supersatd. with MgC₂O₄, there is some adsorption. Thus, when about 0.02 g. of Mg is present in 200 cc. of soln. contg. 0.2 g. of Ca, it is found that only 1.5 mg. of MgO is present in the oxalate ppt. This quantity is independent of the time that elapses before filtering. (2) Since only 0.06 mg. of MgC₂O₄ is sol. in 200 cc. of water, it is evident that in many cases the soln. is really supersatd. with MgC₂O₄ which deposits very slowly. Consequently, the often observed fact that the amt. of MgC₂O₄ pptd. with CaC₂O₄ in the ordinary course of analysis increases with the time that the soln. remains in contact with the ppt. is due to the gradual pptn. from a supersatd. soln. and not, as Richards and others have stated, to the fact that the ppt. slowly adsorbs MgC₂O₄. (C. A.)

Rapid determination of sulphur. FR. KÜHL. *Z. anal. Chem.*, **65**, 185–6(1924).—By taking 0.2 g. of S, boiling it with 50 cc. of N NaOH, adding 5 cc. of perhydrol and then titrating the excess NaOH with N HCl it was found possible to obtain results which were within 0.5% of the values obtained by much more tedious oxidation and pptn. methods. $\text{S} + 2\text{NaOH} + 3\text{H}_2\text{O}_2 = \text{Na}_2\text{SO}_4 + 4\text{H}_2\text{O}$. (C. A.)

Some new methods for the measurement of thermal conductivity. T. BARRTAT AND R. M. WINTER. *Phil. Mag.*, **49**, 313–23(1925); cf. C. A., **9**, 2345. (C. A.)

Methods of obtaining an insight into the structure of ternary systems. W. GUERTLER. *Forschungsarbeiten zur Metallkunde*, 1923 [1], 19 pp.; *J. Inst. Metals*, **32**, 537-8.—A description is given of the method of building up the diagram of a ternary system from a knowledge of the equilibria in the 3 binary systems involved, and it is shown how the ternary system itself may be split up into 2 or more binary systems in cases where compds. are formed between 1 or more pairs of the constituents. Two generally applicable rules are formulated: (1) In those systems in which binary compds. are formed only between 1 pair of the constituents, mixts. of these compds. with the third constituent behave like binary systems (the so-called quasi-binary systems), and it is possible to divide the whole triangular diagram into a no. of smaller triangles without carrying out any expts. (2) If 2 elements *A* and *B* form no compds. with each other, but each forms 1 or more compds. with a third element *C*, then the compds. of each element richest in *C* are in equil. with each other and form a quasi-binary system. These laws are illustrated by descriptions and diagrams of the equilibria in the systems Ag-Pb-Sb, Ni-Pb-Sb, Pb-Cu-S, Mg-Zn-Al and Ni-Sb-S. (C. A.)

Data of geochemistry. F. W. CLARKE. U. S. Geol. Survey, *Bull.*, **770**, 841 pp. (1925); cf. *C. A.*, **15**, 3059.—The fifth edition. "Not an exhaustive monograph upon geochemistry, but rather a critical summary of what is now known, and a guide to the more important literature of the subject." (C. A.)

A determination of the melting and transition points of potassium dichromate. P. L. ROBINSON, G. E. STEPHENSON AND H. V. A. BRISCOE. *J. Chem. Soc.*, **127**, 547-9 (1925).—The m. and transition points of $K_2Cr_2O_7$ were redetd. by the cooling-curve method, with a Pt resistance thermometer, and found to be 398.4° and 236.8°, resp. (C. A.)

Some previously unknown properties of simple compounds, and remarks on the kinds of solid states. ERNST FRIEDERICH. *Z. Physik*, **31**, 813-27 (1925).—The m. p. in degrees abs. of the following substances are: TiN, 3200; ZrN, 3200; VN, about 2320; CbN, about 2320; TaN, about 3070; ScN, about 2920; TiC, 3400-3500; ZrC, 3400-3500; V_2O_3 , 2240; VC, 3100; Mo_2C , 2500-2600; MoC, 2840; WC, 3150. TiN, ZrN, TiC, ZrC and VC are stable at the m. p.; the other compds. dissociate somewhat. The following elec. resistivities were measured, the units being ohms per mm.²: CuBr, 18,000; CuI, 13; ZnO, 1.8×10^{10} ; CdO, 47; Tl_2O_3 , 47; Ce_2O_3 , ∞ ; SnO, 1.5×10^8 ; V_2O_5 , 55; V_2O_5 , 31,000; Cb_2O_3 , 860; Cb_2O_5 , 11.4×10^6 ; Ta_2O_5 , 100; Ta_2O_5 , ∞ ; Bi_2O_5 , 1.2×10^8 ; MoO_3 , 7.8×10^{10} ; Mo_2O_5 , 9.5; MoO_2 , 40; WO_3 , 1.8×10^9 ; W_2O_5 , 4.56; WO_2 , 9.8; UO_2 (blue), 30,000, (brown), 26.5×10^6 ; U_3O_8 , 42×10^6 ; Ni_2O_3 , 5.2×10^8 ; Co_2O_3 , 194,000; Co_3O_4 , 240,000; CoO, ∞ ; WS, 8.6; TiN, 1.3; ZrN, 1.6; VN, 2.0; CbN, 2; ScN, 3.08; TiC, 1.8-2.5; ZrC, 1.56; VC, 1.5; CbC, 1.75; TaC, 1-2; Mo_2C , 0.98; MoC, 0.49; WC, 0.53; SiC, ∞ . The resistivities of the carbides and nitrides were also measured for the melts. F. classifies cryst. solids in the following groups: Noble-gas lattice, electrons not involved, example solid A; mol. lattice, electrons involved in holding atoms together to form a mol. but not involved in holding mols. together, example solid CO; ion lattices, example NaCl, show electrolytic condy.; atom lattice without condy., example SiC; atom lattice with a free valence electron, example metals and MoC; atom lattice with concd. due to kernal electrons, examples CdO, PbO_2 ; atom lattices with both types of condy., examples Pb and Tl. (C. A.)

The thermal expansion coefficient of crystalline substances. YOSITOSI ENDŌ. *Rept. Aeronautical Res. Inst. Tokyo Imp. Univ.*, **1**, 225-43 (1924).—The mechanism of thermal expansion of cryst. substances and the variation is elucidated upon the ground of Born and Lande's theory (*C. A.* **18**, 1942) and the quantum theory. The involved formula for the expansion coeff. is $\alpha = (K\gamma/3v)(dE/dT)_p$ where *K* is the compressibility, γ is a const. related to the force function, *v* is the vol. per mol. and *E* is the energy

of thermal oscillation per mol. For metals $K = 9\delta^4/(nx - 1)a$, where δ is the length of side of the unit cryst. cube, a is the Madelung const. and n is a const. or repulsion. The value of a comes out $13.94e^2$ for face-centered lattices, showing that the no. of electrons equals the no. of atoms (a lattice of $+$ ions and electrons); it is $47.8e^2$ for body centered lattices or the no. of electrons is twice the no. of atoms; it is $59e^2$ for diamond, which like ZnS, must show 2 lattices, one with $+4e$ and one with $-4e$ per atom. (C. A.)

Isomorphism of stannous and lead oxides. G. R. LEVI. *Nuovo cimento*, **1**, 335-44(1924).—SnO has a tetragonal structure with a c/a value of 0.895, which is inconsistent with the existence of a cubic form, at least under the conditions of prepn. described. PbO in the red form has a structure analogous to that of SnO. The c/a value is 0.90, which establishes the isomorphism of the two. The following represents a summary of an extended series of measurements:

| | a | c | c/a | Density | | |
|-----|---------|---------|-------|---------|---|---|
| SnO | 5.33 A. | 4.77 A. | 0.895 | 6.53 | $\frac{a \text{ PbO}}{a \text{ SnO}} = 1.041$ | $\frac{c \text{ PbO}}{c \text{ SnO}} = 1.048$ |
| PbO | 5.55 A. | 5.00 A. | 0.90 | 9.51 | | |

(C. A.)

Molecular symmetry in crystal structure. J. H. SMITH. *Nature*, 334-5(1925).—S. detd. the cryst. structure of K salts, using the ionization spectrometer. KClO_3 : monoclinic, and similar to NaCl. The edges of the half-mol. parallelepipedon are 3.56, 3.69 and 3.69 A. KBrO_3 ditrigonal, pyramidal, pseudocubic, body-centered, like CsCl. The edge of the 1 mol. pseudocube is 4.46 A. KIO_3 : monoclinic, pseudocubic CsCl type, 1 mol.-parallelepipedon of edges: 4.57; 4.50; 4.50 A. From the similarity between simple (NaCl) and complex-radical salts (KClO_3), S. concludes that the symmetry is independent of the position of the atoms in the radical. This confirms the relationship pointed out by Clark (C. A. **17**, 2068). (C. A.)

Allotropy of the sesquioxides of iron, chromium, and aluminium. GEORGES CHAUDRON AND HUBERT FORESTIER. *Compt. rend.*, **179**, 763-6(1924).—Curves are given showing the differential expansion, with respect to a standard substance, of compressed rods of Fe_2O_3 , Cr_2O_3 and Al_2O_3 (Chevenard's method, C. A. **15**, 1008). These oxides, when prepd. by desiccating the hydroxide at low temp., undergo a transformation at 400° , 500° and 600° , resp., which is accompanied by the evolution of heat and incandescence, and which ruptures the compressed rods. Therefore, they were made of oxide previously calcined at 1000° . The coeff. of expansion of Fe_2O_3 increases progressively with the temp. and passes through a max. at 680° . Fe_3O_4 shows a similar anomaly of expansion at 570° (Chevenard, C. A. **15**, 1645). It is suggested that the disappearance of the ferromagnetism of Fe_2O_3 may coincide with the change which occurs at 680° . If the rods of Fe_2O_3 and Fe_3O_4 are cooled rapidly by quenching, the curves indicate a contraction at 400° and 500° , resp., but return to the normal curve at 600° and 550° , resp. The curves for calcined Al_2O_3 and Cr_2O_3 are regular, presenting none of the anomalies of Fe_2O_3 . The coeff. of magnetization of calcined Cr_2O_3 is 3 times less than that of the unstable oxide detd. before calcining. That of unstable Fe_2O_3 is 20 times greater than that for calcined Fe_2O_3 . (C. A.)

First report on heat insulators. EZER GRIFFITHS. *Dept. of Sci. and Ind. Research, Fuel Investigation Board, Special Report*, No. **5**, 1-53(1924).—A new app. has been devised for measuring the insulating value of cork, cement, rubber, etc. The results of the measurements and of the calcd. thermal conductivities are given in detail. (C. A.)

Saturation capacity of clay soils. D. J. HISSINK. *Z. Pflanz. Düng.*, **A4**, 137-58 (1925); *J. Soc. Chem. Ind.*, **44B**, 293(1925).—Methods for detn. of saturation capacity and degree of satn. are given. Results are recorded of a number of such determinations,

and their bearing on the state of flocculation of the solid colloids, the pH value of the soil, and the lime requirement, is discussed. A close relationship is indicated between degree of saturation and the propn. of replaceable Ca present represented as a percentage of the amt. of clay. Conductometric measurements of equiv. wts. of humus and clay give values of 18 and 115, respectively, although rather wide fluctuations occur with clay.

H. H. S.

BOOK

Zsigmondy Festschrift. Ed. by W. BACHMANN AND WO. OSTWALD. Pp. 390. Dresden: Theodor Steinkopf, 1925. Price, 20 m. A graceful tribute, in the form in which the Germans excel, to the well-known authority on colloids.

H. H. S.

PATENTS

Manufacture of magnesia from dolomite. CAMILLE CLERC and ARMAND NIHOUL. U. S. 1,541,116, June 9, 1925. The process, which comprises calcining dolomite at a temp. above that necessary for decarbonation and sufficiently high to make hydration of the magnesia difficult without preventing hydration of the lime, swelling the lime-magnesia mixt. without completely hydrating the lime or dissolving the same separating the powder thus formed from the non-hydratable portion, and mixing the powder obtained with an excess of magnesium chloride to rapidly ppt. the partially hydrated magnesia in a readily filterable granular form.

Magnesium extraction. BRODDE E. F. RHODIN. U. S. 1,539,955, June 2, 1925. The process of extracting magnesium from magnesium alloys which comprises treating such alloys in a bath of molten alkali having chem. affinity for the metal or metals with which the magnesium is alloyed and for which the magnesium has a natural chem. neutrality.

Process of recovering titanic oxide from titanium-nitrogen compounds. PEDER FARUP. U. S. 1,539,996, June 2, 1925. The process of recovering titanic oxide from titanium nitrogen compds. which comprises mixing the compound with a quantity of sulphuric acid not materially exceeding that required to combine with the constituents of the compd. other than titanium and htg. the mixt. in excess of atmospheric press. whereby the titanium contents of the mat. is obtained as an insoluble ppt. while its impurities as well as its iron and nitrogen contents are obtained as water sol. sulphates.

Preparation of magnesium carbonates. SOMA GELLÉRI. U. S. 1,540,391, June 2, 1925. The herein described process for the production of magnesium carbonate from magnesium carbonates and magnesium silicates containing calcium, which consists in calcining the minerals contg. calcium and magnesium carbonates, then finely grinding the same and mixing with alkali metal-carbonates, dissolving in water, saturated with carbon dioxide, and htg. to from 60° to 70°C, separating the soln. containing the magnesium with the alkali metal as a double carbonic acid salt from the pptd. calcium carbonates and from the other solid residues, and subsequently decomposing by heat into insoluble magnesium carbonate and alkali metal carbonate remaining in soln.

Art of making zirconium compounds. LONNIE W. RYAN. U. S. 1,540,425, June 2, 1925. The method of prepg. granular basic zirconium sulfate which comprises adding sodium chloride to an aqueous zirconium sulphate soln. and subsequently adding an alkali thereto. See *Ceram. Abs.*, 4 [5], 135 (1925).

Process for obtaining magnesia from dolomite. EDGAR EVERHART. U. S. 1,542,684, June 16, 1925. That method for obtaining magnesia from dolomite which consists in first reducing the dolomite to drive off the carbon dioxide, slaking the reduced dolomite, introducing acetic acid to neutralize the lime, separating out the calcium acetate and treating the residual magnesia mass separated from the lime with carbonic acid whereby to dissolve only the magnesia.

General

Sillimanite mine discovered in India. ANON. *The Glass Industry*, **6** [6], 133 (1925).—A mine containing large quantities of sillimanite has been discovered in India. Right to work it has been acquired by Henry A. Golwynne, a New York importer of chemicals. The deposit consists of enormous boulders on the surface. It is 100 miles from Calcutta, two or three miles from a railway. F. G. J.

Our imports and exports. ANON. *Pottery, Glass and Brass Salesman*, **31** [19], 9(1925).—Foreign trade figures on crockery and glassware given for and including the month of April, 1925. F. G. J.

Charles F. Binns—A man and a ceramist. R. C. PURDY. *The Pottery, Glass, and Brass Salesman*, **31** [19], 13(1925).—Address made at the annual commencement exercises of Alfred University on June 9th in eulogy of Prof. Binns, head of the University's school of ceramics for a quarter of a century. F. G. J.

The old Liverpool potteries. P. ENTWISTLE. *The Pottery Gazette and Glass Trade Review*, **50** [574], 604–8(1925).—This article is a report of a lecture given by E., Deputy-Curator of the Liverpool Museums, at a meeting of the Art Section of the Ceramic Society. The lecture was based on the results of seven years of research, during which time the town records were searched back as far as the year 1600, for the purpose of obtaining an authentic history of the old Liverpool potteries. P. D. H.

"Dust counting." ANON. *The Pottery Gazette and Glass Trade Review*, **50** [574], 598–600(1925).—This article is a report of a lecture given by E. L. Middleton, H. M. Medical Inspector of Factories at a meeting of the Ceramic Society and deals with the effect of dust on the human being, with special ref. to silica dust; the available methods of measuring the amount of dust in the atmosphere; and the precautionary measure adopted in order to combat the harmfulness of dust in the pottery industry. P. D. H.

A new ceramic material. ANON. *Ceramic Industry*, **4** [4], 294(1925).—In this mat. developed by the Germans and called "Keramonit," there is apparently a complete union of metals and minerals attained through heat. The body is prepd. by embodying a mesh or skeleton of whatever metal compn. desired in the ceramic mass, similar to the procedure followed in the manuf. of wire glass. In firing, the metal loses its identity and a homogeneous structure results. The mat. is absolutely immune to sudden temp. changes. It has very great mech. strength and is an excellent conductor of heat and a variable conductor of electricity. It is resistant to chem. action and possesses extreme flexibility permitting it to be bent at right angles. P. D. H.

Measuring metals' resistance to shock. R. G. WALTEBERG. *Chem. Met. Eng.*, **31**, 657–8(1924).—The results of notched bar impact tests are so dependent on the type, of specimen, that a method whereby a metal's resist. to rupture in impact may be expressed independent of the type of specimen used would be desirable. This author applies the method of Fillunger to monel metal. The energy to produce fracture in an impact specimen is considered as of two parts; that required to produce deformation, and that required to fracture the specimen. Formulas are given for detg. these energies, contg. two constants, δ and 2ω which are characteristic properties of the mat. representing its resist. to deformation and fracture. A formula for "notch toughness," e , is then derived, e equals δy plus 2ω where y is the eccentricity of the specimen, or the distance of the center of gravity of the area of fracture from the axis of the bore of the notch. By detg. notch toughness for several different values of y , values for δ and 2ω can be obtained, which are characteristic of the metal, and independent of the type of specimen making such tests on monel metal in a Charpy impact machine, the values δ equals 61 m. kg. per cv. cm. and 2ω equals 1.8 m. kg. per sq. cm. were obtained. A table of these values for other mat. is given. M. E. M.

Investigations in ceramics and road materials. H. FRECHETTE, L. P. COLLIN, H. GAUTHIER AND R. H. PICHER. *Canada Dept. of Mines*, **619**(1925).—The value of clay products made in Canada, in million dollars, is as follows: 1910, 7.6; 1911, 8.4; 1912, 10.6; 1913, 9.5; 1914, 6.9; 1915, 3.9; 1916, 4.1; 1917, 4.8; 1918, 4.6; 1919, 7.9; 1920, 10.7; 1921, 8.9; 1922, 11.4; 1923, 10.3. The 1922 peak, however, does not represent the quantity production of the 1912 peak. A notable feature since the outbreak of the war has been the marked rise and fall in the production of farm tile. From 1916 to 1919, when all other branches of the clay industry were at their lowest ebb, a rapid rise in farm tile production corresponded with the rise in the price of farm produce; during the ensuing 3 years, the demand for drain tile fell with the fall of farm produce prices. It will probably be some years before the building trades have become stabilized enough to bring brick production up to pre-war levels even in Eastern Canada. In W. Canada very little construction is going on. An exhibit of Canadian ceramic products, assembled for the British Empire Exposition at Wembley, embraced all the various types and color range of brick, structural and drain tile, sewer-pipe and other salt glazed ware, firebrick, stoneware, pottery, electrical porcelain, sanitary ware, enameled iron, and glass of various kinds. The use of the railroad tunnel kiln is advocated as the most efficient type of firing equipment; the fuel saving is 50–85%, labor costs are cut in half, ware is fired more uniformly, and time in kiln is reduced from 12 to 4 days. Work was continued on the investigation of road mats. adjacent to the main highways of the country, and a study was made of existing gravel roads in Ont. and Quebec for the purpose of establishing what properties of a gravel control its usefulness as a road mat., particularly with regard to the common fault of gravel roads known as corrugated, or "washboard," surface. H. H. S.

Chalk in chemical industry. W. A. ROTH. *Chemische Industrie*, **48**, 266–9(1925).—Follows CaCO_3 through its industrial uses in pottery, glass, iron and steel, sugar, and carbide manufacture. H. H. S.

The stream-line filter applied to the filtration of pigments. J. A. PICKARD. *J. Oil and Colour Chemists' Assoc.*, **8**, 36–46(1925).—The principle of the stream-line filter (*C. A.*, **18**, 2981) has now been adapted for handling suspensions contg. high amts. of solids which are to be recovered. Filtering packs have been developed for use in filter presses and suction filters, and these have quickly and completely recovered, in one filtration, $\text{Fe}(\text{OH})_3$ and other ppts. which remained in suspension for weeks, and which readily passed unchanged through filter paper. It is particularly advantageous for filtering Prussian blue, and other troublesome pigments. Illus. (*C. A.*)

The industrial dust problem. II. Review of the methods for sampling aerial dust. L. GREENBURG. *U. S. Public Health Repts.*, **40**, 765–86(1925).—The important methods of dust sampling are reviewed and a list of 79 recent publications on the subject is given. An ideal method should reveal the no. of particles between 0.5 and 10 microns in size; of far less importance is the wt. of the dust because a single large particle does more harm than many smaller ones. The methods may be classified roughly as those involving condensation, filtration, washing, sedimentation, impinging, electrostatic action and resistance. Typical methods of each of these classes are described. (*C. A.*)

PATENT

Pyrometric cones with protective covering. H. SEGER and E. CRAMER. Ger. 406,835, July 1(1922); *Jour. Soc. Chem. Ind.*, **44B**, 319(1925).—More trustworthy temp. measurements are obtd., particularly in presence of moisture or of gases which are not inert, if the cones are coated with resistant resin varnishes, especially of artificial resins. H. H. S.

Bentonite in textile and paper manufacture. ANON. Brit. 226,850. *Chem. Trade Jour. and Chem. Eng.*, **76**, 559(1925).—A colloidal silicate, such as bentonite is

used alone or in conjunction with the usual finishing or loading materials such as agglutinant size, soap, starch, china clay or Epsom salts, for treating organic fibrous materials such as textile yarns, fibers and fabrics, and leather. In loading paper, the colloidal silicate is always used in conjunction with the filling material. The bentonite or other colloidal silicate is stated to have power of absorbing material and of being absorbed by the fabrics, etc.

O. P. R. O.

BOOK REVIEWS

A Textbook of Glass Technology. By F. W. HODKIN AND A. COUSEN. 1st Ed. 551 pp. $5\frac{15}{16} \times 9\frac{11}{16}$ inches. D. Van Nostrand Co., New York, 1925. Price, \$10.00.

Although the manufacture of glass is one of the oldest chemical industries, the literature is quite disconnected and this volume represents the first comprehensive attempt at a collection of the great mass of information, data and practical experience into a single authoritative treatise of such a nature as to permit of its employment as a general textbook on glass technology. It is, unquestionably, the best treatise on glass technology in the English language, and, so far as the reviewer is aware, is the only book thus far written which has covered the entire subject in so thorough and comprehensive a manner. The book is of particular value because it brings together in one place a complete but simple and concise discussion of practically every phase of the subject of glass.

This treatise is primarily intended to be used as a textbook but, owing to the adequate manner in which the field of glass technology is covered, can be used quite advantageously as a reference book. The authors, Messrs. Hodkin and Cousen, are experienced teachers, being connected with the Department of Glass Technology, University of Sheffield, and, as such, realized the great need of a textbook on glass technology of such a character as to allow the student to seriously attack this field in a systematic and thorough manner; thus, avoiding the necessity of having to wade through a maze of patent specifications, data, theories and more or less superfluous information in order to obtain more than a mere speaking acquaintance with this fascinating field. It should be emphasized here that the word "student" is used in its larger sense, namely, not only the students in universities and colleges, but any one who is trying to increase his or her knowledge and applies equally well to the plant manager, plant chemist or engineer and the ordinary workman. They can one and all materially benefit themselves by carefully perusing this interestingly written book.

Whether or not the reader can always agree with all of the authors' ideas, he should, at least, be grateful to them for a complete but concise discussion of both the old and the new in glass technology. In cases where doubt may arise and in all other appropriate cases, such as the referring to specific instances, the original references are cited, both sides being presented. Obviously, the authors have handled this situation correctly because what may appear to be an indisputable fact to some one may appear to be scarcely more than a guess to some one else, both of whom are authorities on the subject.

The first 61 pages, with the exception of the first 11, which are devoted to a brief historical discussion, are concerned with the wholly scientific side of glass, such as optical properties, viscosity, elasticity, density, thermal endurance, annealing, durability, etc. The next 71 pages are devoted to a discussion of the raw materials (basic oxides, acid oxides and miscellaneous materials) used in glass manufacture, their preparation, use and effects on the physical and chemical properties of the finished glass being mentioned. Also, numerous batch formulas are given which cover the entire field from selenium ruby glass to plate glass. Next, there is a 3-page discussion of decolorizing

glass followed by 14 pages devoted to the mathematics connected with calculations likely to be encountered in glass making. After this, the storage and mixing of batch materials are taken up, being followed by a chapter on the composition of glass and devitrification. This is followed by 91 pages devoted to heat and its various ramifications, such as combustion, fuels, thermochemistry and the valuation of fuels, pyrometry, etc. In this group is an excellent chapter on producer gas and gas producers in which various types of producers are clearly described and illustrated. Following this, is a 57-page discussion of refractories and their use, including silica brick, fire clays and the manufacture of glasshouse pots and blocks. Following this is a 77-page discussion of furnaces in which various types of annealing furnaces, oil-fired furnaces, direct and semi-direct furnaces and both recuperative and regenerative gas-fired furnaces are clearly described both as to construction and operation, being supplemented by drawings and photographs. The remainder of the book, 124 pages, is devoted to a discussion of the manipulation of glass in which bottle making, sheet glass, plate glass, rod and tubing, optical glass and hollow ware are interestingly treated. Various types of machines employed in these processes are described and illustrated both by drawings and photographs. Attention should be called at this point to the fact that the authors successfully avoided making their sections on furnaces, machines and processes simply a compilation of patent specifications and manufacturers' catalogues.

The book is singularly free from errors and inaccuracies. Since the writing of the book, discoveries have been made which will call for the revision of certain parts of the text if a second edition is published. For example, on page 169 appears the old $\text{Al}_2\text{O}_3\text{-SiO}_2$ diagram in which sillimanite is shown. It is now known that mullite, $3\text{Al}_2\text{O}_3\text{-2SiO}_2$, is the only compound of alumina and silica stable at high temperatures. Of course, this completely alters the diagram. This discrepancy also appears on pages 323 and 298. The wollastonite-silica diagram on page 173 is not complete.

The book is attractively bound and printed on good paper and has some excellent photographs. In all, there are 251 illustrations, including a photograph of the famous Portland Vase.

The book is to be highly commended for its simplified and complete presentation of a difficult subject. It is the reviewer's opinion that it should prove to be a valuable desk book for all whose interests touch on the technical side of glass.

A. ERNEST MACGEE

Non-Metallic Minerals, Occurrence—Preparation—Utilization. RAYMOND B. LADOO. McGraw-Hill Book Company, New York City. \$6.00.

A book of 686 pages by Raymond B. Ladoo covering the technology of the non-metallic minerals.

The commercially important minerals are treated under the following heads: (a) composition; (b) general description; (c) physical properties; (d) occurrence; (e) production, consumption and reserve; (f) mining and preparation; (g) marketing; (h) specifications and tests; (i) utilization. Mining and preparation are in most instances more fully discussed than are the other phases.

The minerals are taken up alphabetically.

A valuable feature of the book is the bibliography which follows the discussion of each mineral.

In a short appendix appear sections on (a) scale of hardness; (b) scale of fusibility; (c) Seger cones; (d) atomic weights; (e) a short general bibliography covering books, periodicals and federal and state publications on non-metals.

The book brings under one cover a mass of information of value to the ceramic technologist. The minerals which are of most interest to the ceramist are taken up in a very concise and in some cases a detailed manner. In a few instances, however, the

demands of the publishers for brevity have cut the discussion of some of the ceramic minerals unduly.

Any one desiring information in regard to sources, methods of winning and beneficiation, and utilization of the non-metallic minerals will find the book of value.

Due to his connection with the Bureau of Mines as Mineral Technologist, Mr. Iadoo was especially fortunate in having available all the resources of the government for collecting data both from the literature and in the field in the compilation of the data contained in this volume.

GEORGE A. BOLE

FALL MEETING
AMERICAN CERAMIC SOCIETY

Grand Central Palace
New York City

October 1, 1925

This is Ceramic Day at the Tenth
Exposition of Chemical Industries.

The program for the day is sponsored by the Committee on Education of this SOCIETY.

General Theme — Shall ceramic products, their properties, specifications and service requirements be stressed more in collegiate ceramic courses?

Is it desirable and by what methods can instruction be given to men in the plants?

CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from *Chemical Abstracts* by cooperative agreement.

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Abrasives

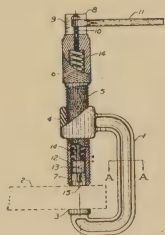
Bauxite. British Guiana. ANON. *Indus. Australian & Min. Stand.*, **73**, 686(1925). —Bauxite mining in British Guiana has developed into an industry of national importance. Shipments during 1923 amounted to 100,346 tons of ore with a declared value of \$5.30 per ton. O. P. R. O.

Marundites and allied corundum-bearing rocks. Transvaal. ANON. South Africa Geol. Society, *Trans.*, **25**, 43(1924).—Marundite occurs extensively in Northern and Eastern Transvaal, and Natal. Mineralogically it is characterized by margarite and corundum (hence its name) as essential minerals present in the proportions varying roughly from 9.1 to 1.1, with as much as 50% of corundum. Chemically it is characterized by a very high content of alumina (up to 70%) and a relatively low amount of silica. O. P. R. O.

PATENTS

Preparation of bauxite. A. McD. McAFEE. U. S. 1,543,934, June 30, 1925. In the prepn. of bauxite for the manuf. of aluminum chloride therefrom the process which comprises dehydrating the bauxite at a temp. below that at which substantial shrinkage takes place and then catalytically depositing carbon in its pores.

Means for determining the relative hardness of abrasive or similar substances. F. A. MANCE. U. S. 1,544,332, June 30, 1925. A device for testing the degree of resist.



offered by a substance to the opern. of a cutting tool, which consists in the combination of a seat for the substance and a tool having a cutting surface; means for driving said tool into contact with said substance when supported on said seat with a predetermined degree and quality of driving force; means for gaging the extent of the penetration of the tool into the substance; means to maintain on said tool, after said initial operation, a constant and uniform press.; means to cause said tool under such press. to operate on said substance with a cutting action; and means for gaging the extent of the penetration of the tool under predetermined conditions and time of opern.

Abrasive composition. HENRY R. POWER. U. S. 1,544,343, June 30, 1925. An abrasive compn. comprising abrasive particles and an algae jelly-product, said compn. being substantially free from either alum or oil substantially as described.

Vitreous bonded silicon-carbide abrasive article. MILTON F. BEECHER, A. A. KLEIN and W. W. GREENWOOD. U. S. 1,546,115, July 14, 1925. The method of forming a vitrified abrasive article comprising the steps of mixing silicon carbide grains with a protective, vitrifiable plastic ceramic bond of low reactivity which is capable of being completely fused to a glassy condition at Seger cone 10, shaping the mass and firing it under a heat treatment which fuses the bond without causing material dissociation of the silicon carbide and coats the grains uniformly, thereby uniting them into a unitary structure.

Art

Design. ANON. *The Pottery Gazette and Glass Trade Review*, 50 [575], 767-70 (1925).—This is a report of a lecture given by Paul Nash, Instructor of Design at the Royal College of Art, at a meeting of the Art Section of the Ceramic Society. "To design" was defined as being "to determine," and "design" was defined as being "the expression of purpose animated by spiritual force." A distinction was made between "pattern" and "design" which are too often considered identical. "Rhythm" was defined as the animating force of all expression or as a spiritual agent, animating the material elements of the universe. It was shown how the sense of rhythm comes to people who work by their intuition rather than by their intellect. "Aesthetics" was defined as a sense of beauty in objects. To create something for others which they could not create themselves was given as the function of the artist. The essential qualities of any painting, were given as those which went to make up unity, namely: form, order, variety, a sense of space, an idea of movement, an idea of mass, color and a sense of light and shade.

P. D. H.

Notes on Whieldon pottery. W. EMERY. *The Pottery Gazette and Glass Trade Review*, 50 [575], 770-72(1925).—This is a report of a paper read by E. at a meeting of the Parent Section of the Ceramic Society. Some hundreds of pieces of Whieldon pottery have been unearthed and collated recently and the notes are based on these findings. The types of ware found were slip decorated, salt-glazed, black and red-glazed, agate and mottled.

P. D. H.

Cement, Lime and Plaster

Action of sodium and magnesium sulphates on constituents of Portland cement. G. R. SHELTON. *Ind. and Eng. Chem.*, 17 [6], 589(1925).—Deals with the problem of the action of the so-called "alkali" waters on concrete structures. Describes the prepn. in the pure state of the major substances present in Port. cement clinker, tricalcium aluminate, β -dicalcium silicate and tricalcium silicate and the effects produced on these constituents by solns. of sodium and magnesium sulphates of various concns.

F. G. J.

The setting of cement. H. MALGRAIN. *Rev. Mat. Constr. Trav. Pub.* 186, 57-60; 187, 91-3(1925).—I. Gen. considerations. The setting of cement is considered as being due to the hydration of each of its constituents, and may be expressed as the summation of a number of first order reactions, namely $dx_1/dt = k_1(A_1 - x_1)$, where A_1 is the original quantity of a constituent, x_1 the quantity hydrated at the instant of time t_1 , the differential expression being the speed of reaction, and k_1 a constant. II. Variation of duration of set as a function of temp. Duration of set is taken to mean the length of time between initial mixing and the moment when a Vicat needle 1 mm. square weighted by 300 gs. does not penetrate the mass. A pure cement was allowed to set in contact with water-satd. air in a const. temp. app. The chem. anal. of the cement was SiO_2 , 18.6%; R_2O_3 , 18.6; CaO , 58.2; MgO , 4.32; K_2O , 0.3; SO_3 , 0.3; the free lime content being 5%. The results were 6.5°C, 38 hr.; 10°, 15 hr.; 15°, 8.25 hr.; 22°, 7 hr.; 28°, 5.42 hr.; 40°, 3.25 hr.; 50°, 2.58 hr.; 60°, 1.83 hr.; 70°, 1.17 hr.; 80°, 45 min.; 90°, 30 min. The setting of the cement may be expressed as the logarithmic function of the temp., and may be represented by an hyperbola. III. The processes involved in setting. Stage (1). From the time of final mixing the cement hydrates rapidly and gains strength equally fast, the usual period being a few hrs. Stage (2). Takes several weeks to be completed, and during the time the strength increases less rapidly than in stage (1). The predominant phenomenon is that of dehydration, but the hydration is actually completed and carbonation begun in the same period. Stage (3). This lasts several months. Dehydration is completed and carbonation is the

chief phase. The rate of increase of strength is much slower than in the previous stages. IV. Variation of resist. of cement with time. Briquettes made from the same large batch of cement were broken each day for the first 90 days, then on succeeding months for a year—three briquettes being taken for each day's test. The data given show that max. strength is attained in three months, after which the strength falls slightly with time. This is contrary to the belief that the strength increases proportionately to the logarithm of the time. V. Lime liberated during set. By treating the cement mixt. with a 10% sugar soln. the free lime is obtained in the filtrate where it may be titrated with sulphuric acid. A cement contg. originally 5% of free lime was found to have 7.8% at the completion of set, indicating a liberation of 2.8% of lime during set, attributed to the hydration, $\text{SiO}_2 \cdot 3\text{CaO} + \text{Aq.} = \text{SiO}_2 \cdot \text{CaO} \cdot 2.5\text{H}_2\text{O} + 2\text{Ca(OH)}_2 + \text{Aq.}$ A quick setting cement contg. before mixing 4.53% free lime showed a content of only 2% of free lime after the final set, indicating a recombination of the free lime. The author criticizes the statement of Le Chatelier that the complete hydration of the tricalcium silicate (as indicated above) is the principal reaction of the setting of cement. He concludes that (a) a small amount of lime is set free during set, (b) this quantity is much smaller than would result from the total decompn. of the tricalcium silicate, (c) the quick setting cements which are fired at low temps. and are more rich in acid elements than the ordinary Port. cements contain very little tricalcium silicate. The principal hydraulic component is the tricalcium aluminate (and other aluminates) whose set is much more rapid than that of the silicate. VI. Combined water. Of 28% water used in mixing a cement which had an initial ignition loss of 6.9%, 7.9% of water actually combines with the cement. VII. Dehydration. After the final set about 20% of water is eliminated by evapn. VIII. Carbonation. The last phase of set is the carbonation of the free bases as lime and magnesia. L. N.

Plaster forms. M. DÜRRE. *Tonind. Zeit.*, **49**, 590(1925).—Good plaster should commence to set in 10–12 mins. and then gradually increase in hardness. The plaster should show only a noticeable warming due to setting. Extreme heating upon setting is usually followed by a poor strength and indicates that the plaster is inferior. A good plaster should not settle to the bottom rapidly when thrown in water and should also not float on the surface. H. G. S.

Bauxite and cement industry in France. ANON. *Jour. Soc. Chem. Ind.*, **44**, 609 (1925).—Considerable developments are expected shortly in the bauxite industry, owing to the growth of the aluminous cement industry and the increasing use of Al metal and wire in electrical industries. French deposits of bauxite, approx. 55–60% Al_2O_3 , are estimated at 60 million T. It is proposed to use bauxite also as a decolorizer of oil products, and it is now being used for oil filters. *Ciment fondu* production is steadily increasing. The difference in compn. between Port. and *fondu* cements is given as follows: SiO_2 , Port. 23, *Fondu* 10; Al_2O_3 , P. 7, *F.* 42; CaO , P. 64, *F.* 42; Fe , P. 4, *F.* 6; other, P. 2, *F.* 0. *Ciment fondu* fuses at 1400°C, its production, being rather expensive, is most practicable where cheap hydroelectric power and supplies of bauxite are at hand. The chief plants are the Lafarge works at Moutiers in Savoy and Teil on the Rhone, and the Agout Co. at Luzière in the Tarn. H. H. S.

Colored concrete. ANON. *Chem. Trade Jour.*, **76**, 734(1925).—Tests carried out by the Brit. Port. Cement Assoc. indicate that a permanent green for purposes such as hard tennis courts has been produced. The pigment consists of barytes stained with an organic dyestuff. It is said to be extremely resistant to alkalis, and to cost about a quarter the price of chromium oxide. H. H. S.

Examinations on cements high in alumina. THV. LINDEMAN AND SVERRE HASSEL. *Tids. Kemi Bergvaesen*, **4**, 149–53, 193–5(1924).—Various mixts. of pure Al_2O_3 , SiO_2 and CaCO_3 were fused in an elec. furnace and the cooled melt was ground to 15% residue

on the 4900-mesh sieve. Tests were made for time of set and tensile and compressive strengths of normal sand mortars at 1 and 7 days. The products tested contained 3–22% SiO_2 , 37–63% Al_2O_3 , 25–49% CaO . *Conclusions:* $3\text{CaO} \cdot 5\text{Al}_2\text{O}_3$ is always slow-setting. Pure or in mixts. low in SiO_2 it will give rapidly hardening cements. If the SiO_2 content is increased the cement will be too slowly hardening. $\text{CaO} \cdot \text{Al}_2\text{O}_3$ is the most valuable constituent of the al cement. If the SiO_2 content is increased above 13–15% the formation of $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ will be more prominent and the hydraulic properties of the cement will disappear. With a low SiO_2 content and so much of CaO that the compds. $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ and $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ are formed, the cement will be too quick-setting. With more SiO_2 the formation of $2\text{CaO} \cdot \text{SiO}_2$ will make the cement more slow-setting, but the strengths of the cements with less CaO are not reached. Similar mixts. contg. up to 9% FeO gave high early strengths and acceptable setting times, except one contg. SiO_2 15.5%, Al_2O_3 40.0%, FeO 3.1%, CaO 42.0%, which gave low strengths. All others so tested were lower in SiO_2 . Small amts. of MgO had no harmful effect on strength. (C. A.)

The fundamental cause of the disintegration of concrete. A. H. WHITE. *Concrete*, 26, 157–61(1925).—Disintegration of concrete is caused by vol. changes due to changes in moisture content of the concrete. Frost action and corrosion of reinforcing steel are secondary, and if the concrete is free from cracks, unimportant. The expansion of neat cement bars stored under water at the age of 24 hrs. was: 7 days, 0.030%; 28 days, 0.053%; 2 months, 0.080%; 6 months, 0.090%; 1 yr., 0.100%; 2 yrs., 0.0116%; 5 yrs., 0.144%; 10 yrs., 0.150%; 15 yrs., 0.162%; 20 yrs., 0.161%. The contraction of bars stored in lab. air 15 yrs. and air over CaCl_2 5 yrs. was: 7 days, 0.085%; 21 days, 0.180%; 2 months, 0.225%; 6 months, 0.285%; 1 yr., 0.303%; 2 yrs., 0.354%; 5 yrs., 0.381%; 10 yrs., 0.410%; 15 yrs., 0.416%; 20 yrs., 0.427%. (C. A.)

PATENTS

Artificial marble and like substances. E. DOUZAL. Brit. Pat. 207,497. *Quarry & Surveyors' and Contractors' Jour.*, 30, 87(1925). The present process consists in melting in their crystallization water and at a temp. below boiling point a double salt such as alum or a mixture of two isomorphous simple salts (potassium and aluminium sulphates) which combine to produce a double salt, or again a mixt. of double salts isomorphous with one another (common alum and chrome alum), and mixing hydrated sulphate of lime in powder form with the salts thus melted, the treatment being conducted without the addition of water. These salts contain a high proportion of water in crystallization. The substance produced is a crystalline substance which can be molded, and has the appearance of Carrara marble, green Brazilian onyx, yellow Algerian onyx, marble of the finest and most translucent quality, jade and the like. The several types of marble can be had by varying the proportions of the substances employed, and by adding suitable coloring matter. As water must not be added, it is necessary to select salts containing a high proportion of crystallization water. When it is desired to produce variously colored marbles, the sulphate of lime is mixed with double salts or with mixtures of salts, these salts also containing a high proportion of crystallization water and being isomorphous between them in the case where several salts are used at once. O. P. R. O.

Cement manufacture. A. PETELOT. Brit. Pat. 210,760. *Quarry & Surveyors' and Contractors' Jour.*, 30, 88(1925). This invention relates to a special cement which is intended more particularly for coating purposes. In order to obtain a cement having the appearance of stone, the following composition is preferably employed: Zinc sulphate, 805 kg.; barium chloride, 1,035 kg.; ammonium chloride, 267.65 kg.; zinc oxide, 1,406.25 kg.; silica, 1,753.75 kg.; limestone, 5000 kg. The following composition will be found very suitable for cements having a marble and pottery appearance: Zinc

sulphate, 805 kg.; barium chloride, 1.035 kg.; ammonium chloride, 267.65 kg.; zinc oxide, 2233 kg.; silica, 4000 kg. First, the zinc sulphate is dissolved in a suitable quantity of water (6480 l., for instance, in the case of the compositions given above), at a temperature of about 15°C. After the zinc sulphate is dissolved, the barium chloride is added. The mass is then poured into a mixing apparatus, the desired quantity of ammonium chloride is added, and the mass is left to stand for a few minutes. A certain portion—for example, 406.85 kg.—of the zinc oxide is then added, and mixing is proceeded with. The mass is then evaporated in a kiln at a suitable, relatively low, temperature, for instance, 150°C. After suitable evaporation, the mass is rammed so as to fill up the hollows or cracks produced by the evaporation, and the temperature is raised to about 340°C, at which it is maintained for about 5 min. The mass is then left slowly to cool with the exclusion of air. The material thus obtained is then mixed with the remainder of the zinc oxide—for example, 999.4 kg., and with the necessary quantity of silica. The mixture is then pulverized at about 150°C; then, if necessary, the desired quantity of limestone is added and the whole is thoroughly mixed. The product is then stored in closed containers, as it is preferable to store it thus for at least 10 days before being used.

O. P. R. O.

Artificial stone and the production of articles therefrom. W. H. CLEGG and G. WHITTAKER. Brit. Pat. 221,857. *Quarry & Surveyors' and Contractors' Jour.*, 30, 88(1925). For the purposes of the invention use is made of finely divided sulphur and siliceous sand, the latter being cleaned from all impurities and free from chalk, lime or other compounds of calcium. As an alternative, finely powdered china clay or iron or steel slag may be employed. In certain cases, asbestos fiber in a finely divided condition may also be employed. Suitable proportions for general use are about equal quantities by weight of the sulphur and of the sand or other materials. The sand is thoroughly dried and mixed with the sulphur. The mixture is then heated in a suitable apparatus, preferably in a jacketed pan, the cavity of which contains a heavy oil with high flash-point, so that it will not readily ignite. The pan is heated by means, such as gas, which will enable the heat to be easily regulated. The use of an oil-jacket ensures an even temperature all round the mixture in the inner vessel, and minimizes loss of heat by radiation. A suitable cover is provided to the pan to prevent free access of air to the mixture when heated. The mixture is heated to a temperature of about 400°C and maintained at this heat for a period of several hours, during which the mixture is frequently stirred. Generally speaking, a minimum heating period of six hours is required to ensure complete absence of air bubbles, and consequent freedom from blowholes of articles made from the mixture. During the mixing of the materials, or during the heating of the mixtures, any desired coloring matters may be added.

O. P. R. O.

BOOK

A hundred years of Portland cement. A. C. DAVIS. Pp. xxii + 282. London: Concrete Publications, Ltd., 1924. Price 21s; Leather, 25s.

H. H. S.

Enamels

Melting furnaces for enamels. F. BIGOT. *Rev. Mat. Constr. Trav. Pub.*, 188, 115-9B(1925).—Descriptions with drawings of two furn. for melting enamels. They are of the stationary type, the enamel being melted on a hearth.

L. N.

Glass

The modern production of sheet glass. W. E. S. TURNER. *The Pottery Gazette and Glass Trade Review*, 50 [575], 785-9(1925).—This is a report of a lecture delivered by T. at the Royal Society of Arts. The various processes in use in England, on the

Continent, and in America were described. Among them were the Fourcault and Colburn processes and that developed by the Ford Motor Car Co. P. D. H.

Glass research at the National Physical Laboratory. ANON. *The Pottery Gazette and Glass Trade Review*, 50 [576], 930-2(1925).—This is a specially abstracted report of work done by the Glass Research Association during the year 1924. The departmental reports include the following particulars: (1) Physics dept.—thermometers; clinical thermometers; colored glasses for railway signals and aircraft lights; roofing glasses for aircraft sheds; selective absorption of optical glasses. (2) Electricity dept.—standards of colored glass for ships' lights; standard colored glasses for railway signals; approval tests for ships' navigation lights and lenses. (3) Illumination—transmission of window glass, (a) direct light, (b) diffused light. (4) Metallurgy Dept.—glass research. P. D. H.

The bond of metals with glass. ANON. *Sprechsaal*, 58, 309-10(1925).—The bond of various metals with glass and porcelain are discussed. H. G. S.

Glass furnaces fired with powdered coal. H. BARTH. *Sprechsaal*, 58, 311-2(1925). H. G. S.

Application of science to the glass industry. H. GÖTZE. *Sprechsaal*, 58, 312-3(1925). H. G. S.

The effective wave-length of colored glass used in optical pyrometry. F. HENNING. *Sci. Abst.*, 28 [4], 284(1925); *Zeits f. Physik*, 30 [4-5], 285-96(1924).—From the Reichsanstalt. By deduction from theoretical considerations the effective wave-length of a colored glass is shown to be a function of the color temperature of the radiation transmitted through the glass. An expression is established for the effective wave-length and is obtained from a comparison of the brightness of two sources of radiation of different color temps. The results so obtained are compared with the values calculated by Forsyth and Hofmann for the effective wave-length of Schott red glass F.4512, and good agreement is established. The results are compared in tabular form. A. F. G.

Simulating natural light in metallography. H. S. GEORGE. *Sci. Abst.*, 28 [4], 285(1925); *Trans. Am. Inst. Mining Eng.*, 70, 259-73(1924).—A method of illumination that enhances the value of the microscopic study of opaque materials, as in metallography, consists in the partial eclipse of the illuminating beam by the insertion in its path of opaque discs of various diameters so as to stop off to various extents the axial rays. Structures possessing a relief are given a natural appearance and erroneous interpretation is avoided. The system is referred to as "conical illumination." Illustrations are given of microphotographs of sections of an iron-chromium-carbon alloy showing the obliteration by axial illumination of a constituent shown plainly by conical illumination. In another example, etching figures in ferrite, hitherto considered to be pits, are revealed as pyramids, standing in bas-relief. A. F. G.

The protection of original glass designs by patent. W. FAWCETT. *Glass Ind.*, 6 [7], 142(1925).—Designs may be patented for 3½, 7 or 14 years at proportionate prices. Necessary qualifications are described. F. G. J.

The thermal efficiency of glass melting. D. J. McSWINEY. *Glass Ind.*, 6 [7], 139(1925).—A discussion of factors governing fuel composition. F. G. J.

Causes of crizzles and skin-wrinkles of pressed glass. E. ZSCHIMMER, K. HESSE AND K. MEURES. *Glass Ind.*, 6 [6], 120 and [7], 146(1925).—Translated from *Sprechsaal* 58, 185-7. Considers the glass gob as a leather bag full of liquid. In pressing, the resin may be fractured and crizzles result if it is required to expand greatly or if the mold is too cold. The automatic machines are superior to hand work in preventing this. Wrinkles are due to the contraction of the inner glass on cooling, drawing the surface with it. Several expts. illustrated. F. G. J.

Colored glass in goblet making. C. DUVIVIER. *The Glass Worker*, **44** [39], 13 (1925). (Translated from *La Verre*, Sept., 1924.) Describes how each of the principal colors are produced. Gives the proportions of oxides to be added, the alterations that must be made in the basic mixture, the proper melting conditions and the right consistency.

F. G. J.

The Volstead Act caused many idle bottle plants. ANON. *Nat. Glass Budget*, **41** [9], 3(1925).—The demand for bottled beer extended throughout the entire year. "Soft drinks" do not create nearly the same demand for bottles. A number of bottle factories have curtailed production or shut down and the loss is felt in allied businesses.

F. G. J.

English Society of Glass Technology discusses constitution of glass. ANON. *Nat. Glass Budget*, **41** [9], 13(1925).—At the May meeting of the Society of Glass Technology of England the following papers were read at a symposium on the constitution of glass: The Nature and Constitution of Glass, by W. E. S. Turner. On Glass as Supercooled Liquids, by G. Tammann. On the Constitution and Density of Glass, by A. Q. Tool and E. E. Hill. The Ternary System Sodium Metasilicate-Calcium Metasilicate-Silica by G. W. Morey and N. L. Bowen. X-ray Diffraction Measurements on Some Soda-lime Silica Glasses (a preliminary note), by R. W. G. Wycoff and G. W. Morey. The Structure of Quartz, by William H. Bragg. The Viscosity of Glass by Vaughan H. Stott. Abstracts of these papers are given.

F. G. J.

Viscosity measurements with glass. V. H. STOTT, E. IRVINE AND D. TURNER. *Proc. Roy. Soc.*, **108A**, 154-71(1925); *J. Soc. Chem. Ind.*, **44B**, 449(1925).—Viscosity-temp. curves for 13 glasses were detd. by observing the time taken for rotation through a given angle when circular rods are subjected to a given torque. At high temps. the viscosities were detd. by measuring the rate of fall of a partially counterpoised sphere of Pt-Ir alloy through the glass. The viscosities found ranged from 10^2 to 10^6 C. G. S. units.

H. H. S.

The glass industry. ANON. *Jour. Soc. Chem. Ind.*, **44**, 650(1925).—The course of the glass industry is said to have been completely changed within the last ten years, mainly by Colburn's mech. methods of mfg. glass, the patents of which have been acquired by the Libbey-Owens Co. The first mach. was made in 1905, and the first factory was built at Charleston, Va., in 1916. Success in the U. S. led to developments in Canada, Japan and Europe, most of all in Belgium where post-war reconstruction coincided with the elimination of the glass-blower. The International Company (Libbey-Owens process) established a factory at Gompel, Belgium, where the capacity of half a million sq. meters of glass a month is to be doubled. Four other companies are exploiting the process at Moutier (Switz.), Turin (Italy), and at two factories in France, while in Spain production is to begin shortly.

H. H. S.

Characters of glasses in terms of their electromotive properties. J. ZIMMERMANN AND J. SCHNEIDER. Meeting, Vienna Acad. Sci., March 19. *Nature*, **115**, 931(1925).

H. H. S.

Exchange of ions in glasses. K. HOROVITZ AND J. ZIMMERMANN. Meeting, Vienna Acad. Sci., March 19. *Nature*, **115**, 931(1925).

H. H. S.

Germanium glasses. L. M. DENNIS AND A. W. LAUBENGAYER. *J. Am. Chem. Soc.*, **47**, 1945-7(1925).—The positions of Si and Ge in the periodic table make it evident that close analogies between their compds. are to be expected. Glasses similar to silicate glasses but in which SiO_2 is replaced by GeO_2 , were therefore prepared, and it was found that four types of glass: flint, dense flint, borate crown and barium crown, were possible by replacing the SiO_2 by an equimolec. quantity of GeO_2 . The GeO_2 glasses melt at considerably lower temps. than the corresponding SiO_2 glasses and are

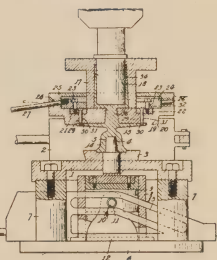
very transparent, free from bubbles, and quite stable, with a higher refractive index. It has also been found possible to make fused transparent GeO_2 similar in appearance to fused quartz.

H. H. S.

Annealing glass with the electric leer. K. M. HENRY. *J. Electricity*, **54**, 356-8 (1925).—The nichrome heating units have a connected load of 160 kw. The power is supplied at 220 v., single-phase, 60 cycle. There is a continuously moving conveyor 5 ft. wide and 50 ft. long. The leer is divided into 3 parts: heating, annealing and cooling. Sil-O-Cel brick is used for insulating the leer. The heat control is maintained automatically within 3° by Leeds and Northrup controlling potentiometers. (C. A.)

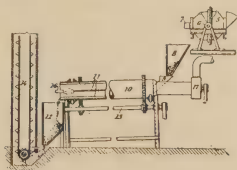
PATENTS

Glass-molding apparatus. C. B. ROE. U. S. 1,543,725, June 30, 1925. Glass molding mechanism comprising a sectional hinged mold, a base for said mold, a valve shiftable through said base into and out of coöperative ware-forming relation to said mold, means for elevating and lowering said valve, said mold having its top face provided with a seat, a mold member complementary to said hinged mold disposed on said seat, a ring mounted upon and vertically movable with respect to said complementary mold member, said ring carrying a plurality of depending pins which are vertically movable through said member, means for elevating and lowering said ring to effect elevation and depression of said pins, and a receiver for molten glass surmounting the central portion of said complementary mold member.

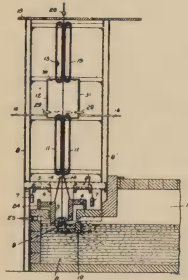


Glass batch. O. W. HILBERT.

U. S. 1,543,770, June 30, 1925. The method of prep. a glass batch from raw mats. that are in the form of a fine powder, which consists in thoroughly mixing the mats., and then subjecting the mixt. to heat of sufficient intensity to form the mats. into small granules, each of which is composed of the desired proportions of raw mats.



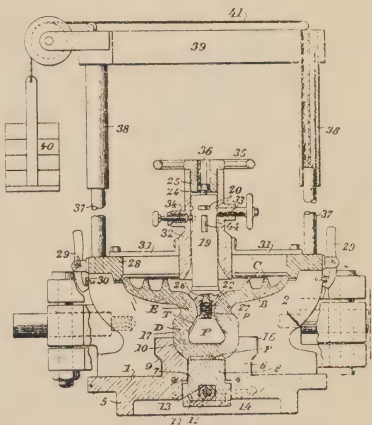
Manufacture of insulators. J. T. LITTLETON, JR. and GORDON S. FULCHER. U. S. 1,543,779, June 30, 1925. The process of mfg. insulators having a suspension pin molded therein, which comprises the steps of pressing a pin into the insulating mat. to embed it therein, and thereafter moving the pin with reference to the insulating mat. to space it therefrom without removing it from the insulating mat.



Apparatus for drawing glass. H. G. SLINGLUFF.

U. S. 1,544,947, July 7, 1925. In combination in app. for drawing glass in sheet form continuously

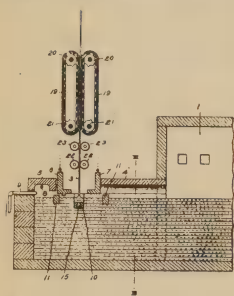
from a bath of molten glass, a pair of opposing belts or bands of flexible asbestos fabric, endless chains at the edges of the belts, and yielding supporting means between the belts and chains for pressing the belts against the glass sheet lying therebetween.



In combination in app. for drawing glass in sheet form continuously from a bath of molten glass, a pair of opposing belts or bands of flexible asbestos fabric, endless chains at the edges of the belts, bars extending transversely between the chains, and a series of spring pressed plungers on each bar engaging the rear faces of the belts.

Apparatus for drawing sheet glass. H. G. SLINGLUFF. U. S. 1,544,948, July 7, 1925. In combination in app. for drawing sheet glass, a glass drawing tank adapted

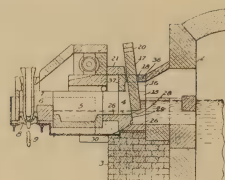
to carry a bath of molten glass from which a sheet is to be drawn, a clay bar extending transversely from one side of the tank to the other and entirely submerged beneath the glass of the tank and provided with a vertical slot lying longitudinally thereof and extending therethrough, and means for drawing a sheet upward from the glass above the bar and in alignment with said slot, the said slot having enlargements at its ends beneath the edges of the sheet being drawn.



Cut-off block or valve for molten glass. GEORGE E. HOWARD.

U. S. 1,544,987, July 7, 1925. A cut-off block or valve for molten

glass comprising a stationary member of refrac. mat. having a flat surface, and a movable member of refrac. mat. disposed on the intake side of said stationary member and having a flat surface engaging the said flat surface of said stationary member, the said members having a substantial range of adjustment beyond their initial closing position, and being capable of wholly cutting off the flow of glass throughout said range of adjustment.



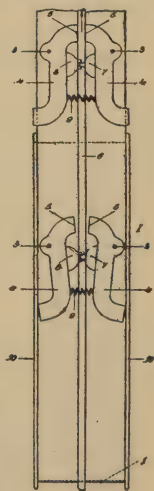
Method of drawing glass cylinders. WILLIAM WESTBURY. U. S. 1,545,222, July 7, 1925. The herein-described method of drawing glass cylinders, which consists in providing a ladle having a glass receiving chamber internally lined with a highly refrac. mat. capable of being heated without disintegration to a temp. above the temp. of a charge of liquid glass at drawing temp. and of storing up such a degree of heat there-

in, heating such ladle while in inverted position by the application of flames concentrated with the ladle and pro-

jected from below directly against said lining so as to apply to and store up in such lining a degree of heat sufficient to maintain portions of a glass charge contained in said chamber and lying in

contact with said lining in liquid condition during an entire ladling period, filling said ladle with a charge of molten glass at a temp. suitable for drawing a cylinder therefrom, pouring such charge into a heated drawing pot during a period while the portions of the charge in contact with the lining are kept liquefied and above congealing point by the abstraction by the charge from said lining of the heat stored therein, and then drawing a cylinder from such charge.

Means for drawing hot glass to glass tubes. WALTER RIEDEL. U. S. 1,545,349, July 7, 1925. Means for the production of glass tubes by drawing, comprising in combination an endless band capable of traveling in one direction, gripping members mounted in pairs on the said band, so as to be capable of pivoting in the plane containing the axis of the glass tube, resilient means capable of coacting with the said gripping members for causing them to grip the tube, and gripping

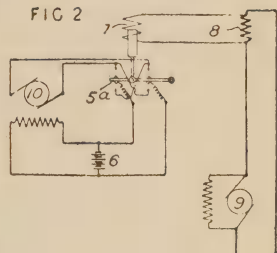


jaws on the said gripping members, which jaws lie in front of the pivotal points of the gripping members in the direction of travel of the said band, as and for the purpose set forth.

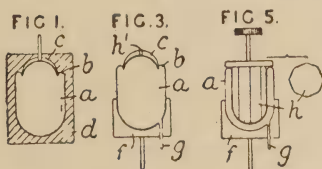
Glass and composition therefor. ROBERT J. MONTGOMERY. U. S. 1,545,508, July 14, 1925. A crown glass comprising antimony oxide in excess of 1% and less than 20%.

Glass and composition therefor. ROBERT J. MONTGOMERY and MURRAY R. SCOTT. U. S. 1,545,509. July 14, 1925. A cerium glass composition containing up to approximately 16% of antimony oxide.

Glass-grinding apparatus. H. HART. Brit. Pat. 15 925(1923). In app. for automatically controlling the operation of glass grinding and polishing app. of the type in which the glass is laid on traveling tables and brought successively under a number of continuously working runners, the power taken by an elec. motor 9 driving the runners is maintained constant by a relay 5^a functioning to vary the speed of the runners or the press. of the runners on the glass. The relay is sensitive to potential variations across a resistance 8 in the motor circuit and controls a servo-motor 10, which derives power from a battery 6, and which adjusts a variable resist. in the shunt field of the motor 9. In the alternative form the relay 5^a energizes one or other of two electromagnets, which operate valves controlling the supply and discharge of water to or from tanks, the weight of which is borne by the runners.



Glass manufacture. GLASFABRIK SAPHIENHÜTTE R. BOCK GES. and W. HODECKER. Brit. Pat. 4879(1924). A method of making vacuum flasks consists in blowing a hollow glass body to the shape of the finished outer walls of the flask, and providing a domed portion thereon which is pushed inwards and shaped to form the inner wall of the flask.



The hollow glass body *a*, Fig. 1, is blown in a mold *d* which is so shaped as to form the body with a shoulder *b* and a domed portion *c*. After removal from the mold, the body is held by tongs *f* and a narrow tube *g*, Fig. 3, is added to form the evacuation nipple. The dome *c* is then reheated, and the hole *h*¹, left by the blowpipe, is closed. A tool *h*, Fig. 5, preferably of polygonal cross-section, is then

used to push the dome inwards to form the inner wall of the vessel, the body *a* and the tool *h* being rotated relatively to one another during this operation. In making a flask of the usual type with the neck narrower than the body, the tool *h* is provided with a portion that can be moved radially after the main portion of the tool has passed through the neck of the flask.

Heavy Clay Products

Brick maker's letter from America. J. H. *Tonind. Zeit.*, 49 [40], 558(1925).—Compares present German conditions with those in America in 1914 when 33 1/3% of the plants were closed and many were in receivers' hands. Describes the organization of the N. B. M. A. and State Associations. Gives the benefits derived and suggests similar plan for the Germans. Editorial comment agrees with the suggestion.

F. G. J.

Watersmoking in the ring oven. K. DÜMLER. *Tonind. Zeit.*, 49 [40], 559 (1925).—Takes exception to a system proposed by Hielscher which does not warm the

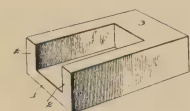
ware over 20° in 48 hours. D. proposes a design with the watersmoking flue above and a down draft through the ware. Illustrations are given. F. G. J.

Does it pay to modernize? E. J. WINKLEMAN, *Brick and Clay Record*, 66 [8], 590-1 (1925).—This article contains suggestions of value in the ceramic manufacturers' remodeling or expanding programs. P. D. H.

Efflorescence on brick. ANON. *Brit. Clayworker*, 34, 51 (1925).—As the formation of efflorescence on bricks hastens the progress of decomposition, strenuous efforts should be made to overcome the troubles which is due to the influence of Na_2SO_4 , Na_2CO_3 and CaSO_4 . The alkalis come from the clay of which the brick are made. The SO_3 is absorbed by the brick during firing and subsequent cooling, principally from gases evolved throughout the process. The CO_2 is absorbed from the atmos. Before employing remedies it would be advisable to study the behavior of the different ingredients used, and observe how they are influenced by the gas fumes. The degree of fineness should be observed together with the sol. salt, SO_3 and S contents. In order to overcome efflorescence, experiments were made using a soln. of weak Fe_2Cl_6 soln. sprayed on a column of clay as this issued from a wire-cut mach. The firing of the brick was then conducted in the customary manner. The foregoing treatment was found to have improved the color of the bricks. The same could not be claimed for those which were treated with a FeSO_4 sol., the latter having proved unsatisfactory. Other experiments were tried applying a 20% sol. by means of a woolen covered roller which produced fair results. It is maintained that the employment of BaF_2 to overcome scumming offers advantages over other salts since it produces no harmful effects on the color and an excess is not harmful. The decompn. of the brick due to efflorescence can be reduced by washing off the crystals formed on the surface of the brick from this source.

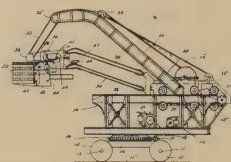
H. G. S.

PATENTS



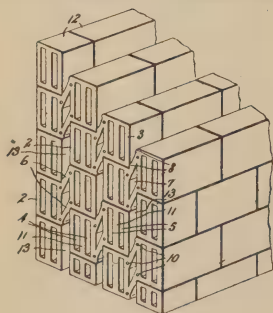
Brick. J. REGAN. U. S. 1,542,909, June 23, 1925. A building brick comprising an integral rectangular brick having a recess located centrally between the longitudinal sides of the brick, one end of the recess opening through one end of the brick and the other end of the recess terminating short of the opposite end of the brick, the cubical area of the recess being substantially one-third of the cubical area of the entire brick.

Gooseneck boom for bricksetters. G. E. LUCE. U. S. 1,543,214, June 23, 1925. In a device of the class described, the combination of a platform mounted for longitudinal movement, a frame rotatably mounted on the platform for movement in a horizontal plane, a crowding frame longitudinally movable with respect to said frame, a boom and parallelly arranged arms pivotally mounted on said



crowding frame, a frame suspended from the boom and pivotally mounted on said parallelly arranged arms, a rotatably mounted brick carrier on said last named frame, an operator's seat on said suspended frame, and means on said suspended frame within convenient reach of the operator for rotating said brick carrier.

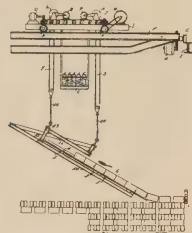
Building block. GLADYS E. WICKSON. U. S. 1,543,635, June 23, 1925. A building block, composed of integral hollow portions connected together by parallel walls extending angularly from the inner edge of the



bedding face of one hollow portion to the inner edge of the bedding face of the other portion, said walls retaining a space between them and the adjacent walls of the hollow portions, and a bead projecting from the outer side of each connecting wall adjacent each bedding face.

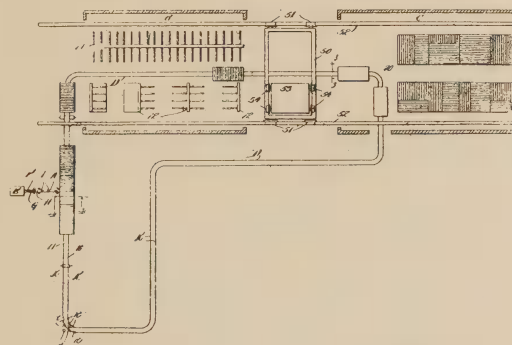
Apparatus for transporting and setting brick and the like.

W. W. DICKINSON, JR. U. S. 1,543,752, June 30, 1925. A pallet for transporting and setting uniform rectangular blocks comprising a rigid rectangular platform having spaced grooves upon its upper surface adapted for the reception of said blocks in longitudinally abutting relation.



Apparatus for handling and transporting brick and the like.

W. W. DICKINSON, JR. U. S. 1,544,819, July 7, 1925. In a device of the character described, the combination with a con-

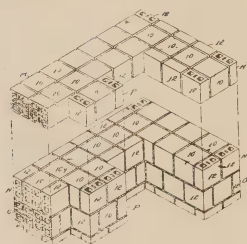


veying belt, of transporting mechanism extending past said belt, trays or pallets carried by said mechanism and movable thereby in a direction parallel to the plane of said belt, and means for inclining said pallets during the period of their passage by said belt, whereby they may become filled with the articles delivered by said belt.

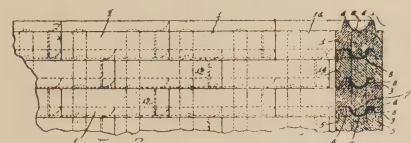
Hollow building block and system of wall construction.

FREDERICK T. HEATH. U. S.

1,544,577, July 7, 1925. A hollow building block the edges of which define a cube and having an outer shell forming four sides thereof and interior transverse double webs connecting the shell walls, the webs being spaced apart a distance equal to the thickness of a mortar joint and forming with the shell a plurality of theoretical smaller cubes having the theoretic shell walls thereof joined by portions of the outer shell and of the transverse webs which portions are of a width corresponding to the thickness of a mortar joint.



Building block. JOHN TROST. U. S. 1,545,173, July 7,



1925. A building block comprising a body formed with longitudinal upstanding ribs at its upper side forming between them a longitudinal channel, said body being formed at its lower side with a longitudinal groove of a width to receive said upstanding flanges of an adjacent block, and also formed with a

longitudinal rib within said groove to engage within said channel of an adjacent block with a narrow space between the surface of the channel and the surface of the rib, whereby when said blocks are placed, one upon another, mortar placed in said channel will be spread and distributed therein by the placing of the block above.

Refractories

On the relation of softening points of the raw materials used in the refractory industry. (Notes on the paper by Hirsch, *Tonind. Zeit.*, 49, 21.) HANS NAVRATIEL.

Tonind. Zeit., 49 [37], 517(1925).—Load tests of refracs. at high temps. are uncertain because so many factors play a rôle. Tests were made under constant load of 1 kgm. per sq. cm. on a Steger press. Temp. was raised 4° a min. from 1000°C to the deformation of the cylinder. A curve was found which at first mounted becoming even flatter, then bent down and then fell, at first slowly, then more or less rapidly. A softening interval was thus measured. It was from the point where the curve began to flatten to horizontal. The temp. of this point is the deformation temp. The end-point was when the cylinder had been compressed 2 mm. or 4%. This point has less significance in practice. Results were:

| | Beginning of softening | Point of change | Compression 4% |
|---------------|---------------------------|--------------------|-------------------|
| Wildstein | | | |
| Fired cone 14 | 1360°C | 1450° | 1600° |
| Saarau | | | |
| Fired cone 14 | 1490°C | 1550° | 1650° |
| Fired cone 17 | 1520°C | 1570° | 1660° |

F. G. J.

The development of the German refractories industry since 1871 and its present status. ANON. *Tonind. Zeit.*, 49 [43], 589(1925).—Gives statistics of production and exports.

F. G. J.

Materials of construction for very high temperatures. H. VON WARTENBURG. *Fuels and Furnaces*, 3 [7], 699(1925).—(Translated from *Chem. App.*) Considers the possibilities and limitations of carbon, zirconia, fused silica, hard porcelain, Marquardt's mass, platinum, 30% iridium-platinum, iridium, tungsten and tantalum. F. G. J.

Quartz glass and silica ware. J. B. C. KERSHAW. *Industrial Chemist*, 1, 208 (1925).—The production of oxygen and hydrogen gases by electrolysis and their application in the arts and industries: The earliest attempts to fuse quartz and to manufacture tubes and other articles of quartz glass were carried out over twenty years ago with oxy-hydrogen flame, by Boys of England and Heraus of Germany. As quartz melts at about 2000°C, it was found quite possible to manuf. small lab. vessels and tubes in this way, and the manuf. of these soon attained considerable proportions, owing to the remarkable properties of quartz glass, the chief of these being its ability to stand sudden changes of temp. without breakage. It was impossible, however, to produce flasks or beakers of quartz glass with the aid of oxy-hydrogen flame, and it is only since the application of the elec. resistance fur. to the manuf. that the industry has developed on a large scale. Quartz glass can now be melted and blown just as ordinary potash glass, and the oxy-hydrogen flame is only employed for building up more complicated app. from the quartz glass tubes and the circular vessels which have been produced by the elec. fur. method.

O. P. R. O.

Magnesite and dolomite. Tasmania. P. B. NYE. *Indus. Australian and Min. Stand.*, 73, 612(1925).—A large deposit of dolomite and magnesite, suitable as regards quantity and probably as regards quality has been discovered in Tasmania. A more detailed examination is necessary before its commercial value can be detd.

O. P. R. O.

Welch brick industry. J. HORTON. *Iron Trade Review*, 76, 1520-1(1925).—Silica brick produced in S. Wales approximates 36 million annually. About a third of the production of this grade of brick is used in Wales, while the rest is shipped to England, Scotland and Europe. Districts producing silica brick in S. Wales include Kidwelly, Penwyllt, Hirwaun, Dowlais, Templeton, Llandeby, Brynamman and Black Mountain. Of these Kidwelly is by far the most important, having the largest kilns in Great Britain. A short description of the brickmaking process in that district is given. H. H. S.

PATENTS

Heat-insulating composition. L. CALDWELL. U. S. 1,544,215, June 30, 1925. As a new article of manuf., a compn. comprising an inorganic heat insulating mat., a vegetable gum capable of forming a gel with water and a distending agent.

Semi-refractory heat-insulating composition, products and processes of making the same. H. T. COSS. U. S. 1,544,433, June 30, 1925. A refrac. heating insulating mat. consisting principally of silica in the form of tridymite, produced by calcining fabricated bodies made of a mixt. of diatomaceous earth, a catalytic inversion agent and water.

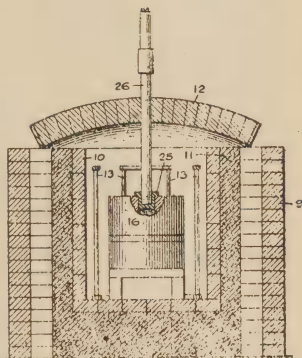
Heat-insulating composition. C. S. TIETSWORTH. U. S. 1,544,196, June 30, 1925. A heat insulating compn. comprising diatomaceous earth, a binding agent, an organic gum capable of forming a gel with water, a fibrous mat., and a distending agent.

Separation of magnesia from dolomite. F. W. BROWN and G. L. AUSTIN. U. S. 1,544,800, July 7, 1925. The process of separating magnesia from dolomite which comprises calcining dolomite, adding calcium chloride, treating the mixt. with sulphuric acid to form calcium sulphate and magnesium sulphate which will react with the calcium chloride present to form magnesium chloride and additional calcium sulphate, and separating the precipitated calcium sulphate from the soln.

Porous refractory article and method of making the same. MINER L. HARTMANN. U. S. 1,545,559, July 14, 1925. A porous refrac. article, containing previously burned porous crystalline aggregates.

Process of shaping fused silica. E. THOMSON and H. L. WATSON. U. S. 1,546,266, July 14, 1925. The process of making shaped articles having the properties of fused silica which consists in filling a mold with a mass of particles of substantially pure crystalline silica and heating the mass throughout to a temperature sufficiently high to convert said silica to the vitreous state, causing expansion, and to cause coalescence of the particles and shrinkage counteracting said expansion.

Refractory articles. H. WADE. Brit. Pat. 19,626 (1923). Hollow refractory containers are made from a composition containing graphite in excess of 15% and a ceramic bond also in excess of 15%, and are burnt at a temperature exceeding 2000°F to vitrify the bond. According to an example, 15-65 parts of graphite, 15-50 parts of clay and 5-15 parts of siliceous material are mixed and burnt until the bond is vitrified (at least 2000°F). Other refractory materials, as alumina, silicon carbide, zirconia, may be employed in addition. Fluxes, such as dolomite, or magnesite, may be added, and on burning produce a glaze on the articles.



Whitewares

The making and firing of glazed ware. - XIX. ANON. *Brit. Clayworker*, 34, 40-1 (1925).—An account is given of the following subjects in this article: (1) Glazes containing SnO_2 ; (2) white glazes containing ZrO_2 ; (3) white opaque glazes containing ZnO ; (4) white opaque glazes containing As_2O_5 ; (5) white opaque glazes containing TiO_2 . H. G. S.

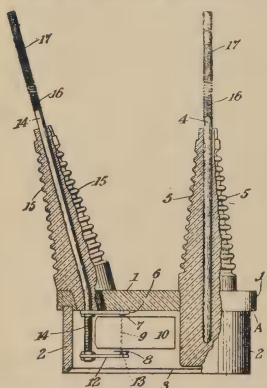
Glazing machines for wall tile. J. MÜLLER. *Keram. Rundschau*, 33, 331 (1925).—In some early types of glazing machines the tile were set on boards. These passed underneath a spray of the glaze by means of rollers. The glaze sprayed on the tile in this manner was pocket like and when fired had a wave-like appearance. Later the

boards were replaced by wire ropes. By using the excess glaze over again many impurities were introduced and it was found too costly to throw the same away. Ten to fourteen thousand tile can be sprayed by one man per 8 hr. day using this process. About 5 h.p. are required to operate this machine. Later the Goldsmith process (American) was developed in which the tile were dipped in the glaze. The thickness of the glaze produced by this process depended upon the absorption of the tile, those which are vitreous will have a thinner coating than those which are more porous, which is therefore undesirable. The more modern machines apply glaze to the tile by means of flushing. Most of the small as well as large plants now have glazing machines even though they cost considerable since they are patented. Ten thousand tile can easily be glazed per hour with this machine. The glaze flows in a steady stream on the tile and the glaze is applied uniformly regardless of the porosity. The advantage of this method of spraying can readily be seen by comparing tile coated in this manner with those glazed by spraying. Only two men are required to operate this machine and the tile are put in saggars as they come from the machine. H. G. S.

Porcelain funnels. F. MAYER. Ger. Pat. *Industrial Chemist*, 1, 52(1925). (*Zeit. für Ang. Chemie*, Nov. 27, 1924).—Porcelain funnels for filters to be kept warm or cold. In this new app. the walls are hollow and have openings for the entrance and exit for hot water and vapor. Heat is conveyed direct to the filtrate, and as porcelain has a high specific degree of heat, it does not cool owing to a temporary interruption of the heating. Expts. have shown that a temp. of 70° is soon conveyed to the filtrate when boiling water is used. The effect is increased by covering up the spout of the funnel with a watch glass. As the Bunsen heater at the side of the ordinary funnel is eliminated, combustible fluids can be heated without any danger of ignition. It is also suitable for filtrates requiring a low temp., obtained by means of cold-producing mixts., so that it can be used for fluids or ppts. that are affected by heat. It can also be used for any ordinary purpose, so that it will not be necessary to keep a special filter. The funnel is made in three sizes, to fit a strainer 70, 90, 140 mm. O. P. R. O.

PATENTS

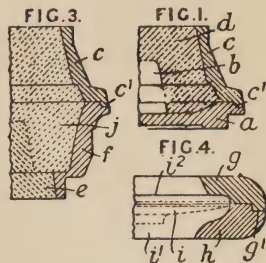
Instrument for locating and observing defective insulator units. C. E. BENNETT. U. S. 1,542,815, June 23, 1925. A portable defective-insulator detector and observation instrument which operates equally well in all positions



for detecting and observing defective insulator units in a series of such units, or otherwise, subjected to a high voltage, comprising in combination, spaced apart conductors highly insulated from one another and from ground for taking the voltage at the opposed surfaces of the insulator unit or units being tested; a rockable balanced indicator element which is rockable from a normal zero position to which it is constrained to return when free of electrostatic stresses to another observable position by the action of the electrostatic field resulting from the difference of voltage between the two conductors; a shield of conducting mat. for adjusting the strength and form of the electrostatic field in which the indicator element moves; a casing for maintaining the above elements in their correct relative position and for protecting the indicator element from undesirable outside influences.

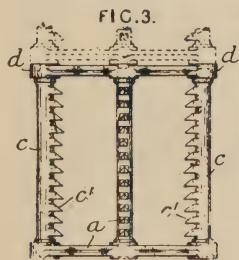
Pottery. J. H. JACKSON, J. A. JACKSON, J. S. JACKSON and J. JONES. Brit. Pat. 7688(1923). App. for casting plaster pottery molds comprises a pair of open-ended, annular elements adapted to inter-engage by a rabbeted connection from which the

formed mold may be removed by separation of the parts. Fig. 3 shows one form comprising elements *c*, *f* having a rabbeted connection *c*¹. The element *f* supports a "lump" or pattern *e* above which plaster *j* is filled in to form a "block" for throwing. After molding the block *j* may be trimmed or cut away. The "lump" *e* is formed by casting plaster in a mold *d*, Fig. 1, which is formed by running in plaster around a pattern *b* carried by or integral with a disc *a* adapted to be surmounted by the element *c* and also formed with the rabbet *c*¹. Fig. 4 shows a modified apparatus for producing flat pressing molds which comprises shallow elements *g*, *h* interengaging at *g*¹ and adapted to receive a plate *i* above and below which are spaces *i*¹, *i*² to receive the plaster.



Enamels and glass. GENERAL ELECTRIC CO., LTD. Brit. Pat. 14,532(1924). Glasses or enamels having a low melting-point consist of a lead borate or lead borosilicate composed of a number of constituents in accordance with the following molecular composition: PbO, 1; B₂O₃, 0.45 to 0.55; SiO₂, 0 to 0.20; Al₂O₃, 0.04 to 0.20; Na₂O, 0.04 to 0.07; K₂O, 0.01 to 0.02; As₂O₃, 0 to 0.01; Co₂O₃, 0 to 0.04. The Co₂O₃ may be replaced by other coloring or opacifying agents. The mixture fuses at a temperature below 400°C, generally between 360°C and 400°C. These enamels are suitable for marking electric lamp bulbs, their low fusing-point preventing the thin glass bulbs from becoming deformed while the enamel is being burnt on. They are also suitable for use as an adhesive between metal, glass, porcelain and the like. They may be used, also, for coating metal or glass bodies by heating the bodies and dipping them while hot into the powdered enamel. Specification 28524/03 is referred to.

Supports for pottery. J. E. TAMS, W. H. EDWARDS and W. T. CONNELLY. Brit. Pat. 15,100/23(1923). Cranks for supporting pottery during firing consist of a metal base *a* with sockets into which are fitted three vertical clay, fireclay or like rods or supports *c* having integral knife-edged projections *c*¹. An upper plate *d* similar to the base may connect the tops of the rods.



Equipment and Apparatus

Design, construction and use of a constant humidity room. R. G. PARKER and D. N. JACKMAN. *Jour. Soc. Chem. Ind.*, **44T**, 223(1925). H. H. S.

Kilns, Furnaces, Fuels and Combustion

Down-draft rectangular kilns. H. DE WITT. *Rev. Mat. Constr. Trav. Pub.*, **188**, 103-6B(1925).—Plans and sketches are given of two types of kilns, differing only in the method whereby the products of combustion are removed. The arch spans two parallel walls in which are situated the fire boxes. The two remaining walls are built separate from the rest of the kiln and each contains a doorway. The flames from the fire boxes are made to rise immediately to the crown of the kiln over bag walls which reach to the foot of the arch. The heat then passes down through the ware and into openings in the floor. Type 1 kiln has two modifications: (a) the openings in the floor are arranged in rows which lead to a common large flue running at right angles to the rows of openings. The flue is centrally located running underneath and between the two doorways and connected to a stack at one end. The draft on the sections of the kiln must be balanced by the partial covering of the openings in the floor. The porcelain

plant at Sèvres has lately installed such a kiln. (b) In the second modification the central flue leads to two stacks each located near a doorway. The draft is then controlled by dampers. In type 2 there is no central flue. Each row of openings in the floor leads to two small stacks located at the ends of the row in the side walls. The stacks flank the fire boxes giving for a small kiln 4 stacks and 3 fire boxes on each side. Each stack has its own damper. Such a kiln may be made quite long and yet maintain complete control of the firing. A similar kiln near Paris has 30 fire boxes and is used for the firing of flower pots.

L. N.

The coking and swelling constituents of coal. FRANZ FISCHER. *Ind. and Eng. Chem.*, **17** [7], 707(1925).—Extraction of coal with benzene at 250°C yields an extract which can be divided into two main components by means of gasoline. One is oily and soluble, the other, solid, brown, insoluble. The oily body is the principal source of the coking quality of coal. The solid body, which is decomposed by heat with gas evolution is the principal cause of the swelling of coal. The relative amounts of each varied with the age of the coal. Expts. were made on the coking and swelling of coals from which these constituents had been partly or wholly extracted and to which they had been separately returned.

F. G. J.

Auxiliary equipment for oil burning. KESTER MILLER. *Fuels and Furnaces*, **3** [7], 707(1925).—A discussion of oil heaters, meters and valves for the edification of operators of fuel oil systems.

F. G. J.

Reactions in the fuel bed of a gas producer. R. T. HASLAM, F. E. ENTWISTLE AND W. E. GLADDING. *Ind. and Eng. Chem.*, **17** [6], 586(1925).—Gas samples were withdrawn from the fuel bed of gas producer, precautions being taken to prevent channeling of the gases and to stop reactions once the gases entered the sampling tubes. Analyses showed: (1) The oxygen is first completely consumed in a very thin zone with the formation of carbon dioxide. (2) No water is decomposed and only a small amount of carbon monoxide is formed until all the oxygen is consumed. (3) Steam is reduced by the solid carbon fuel only in the lower portion of the reducing zone, immediately above the oxidation zone. Carbon dioxide is also largely reduced within this zone. (4) Above this zone the only water decomposed is by the reaction, $\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$. Simultaneously some carbon dioxide is reduced by carbon.

F. G. J.

Preheating chambers. ANON. *Brit. Clayworker*, **34**, 54(1925).—To insure high efficiency from fuel, a sufficient number of preheating chambers should be employed on continuous kilns to utilize the waste heat from cooling kilns. The number of chambers to be employed depends upon the temp. of the kilns when heated to their maturing point. For example, a kiln heated to 950°C will not supply sufficient heat for a large number of preheating chambers whereas once heated to 1200°C will supply sufficient heat for a larger number of heating chambers. Another fact which affects the number of chambers is the dampness of the contents. To raise the temp. of a perfectly dry brick to 100°C requires only 14 heat units, but to remove 1 lb. of H_2O from a brick requires nearly 1000 heat units, and even then the temp. of the brick would not be increased. Unless the brick are perfectly dry a large number of preheating chambers cannot be used. The closeness with which the brick are set may also effect the number of preheating chambers. The temp. of the gases at the base of the chimney of a continuous kiln ought never to be less than 100°C and that of the gases leaving the kiln chambers and entering the main flue ought not be less than 120°C; yet in many kilns they are much less than this—with the results, that brick are scummed or cracked or the output of the kiln is so low as to make the manuf. unprofitable. Assuming that the finishing temp. is 950°C it ought to be easy to pass the waste gases through at least four chambers before the temp. has dropped to 120°C. The use of a fan to drive the heat through chambers may permit the use of a greater number. Many continuous

kilns are so short that they do not admit of a sufficient number of chambers being used for preheating; with such a kiln the possibility of adding more chambers is always well worth consideration, as broadly, the number of chambers is inversely proportional to the consumption of the kiln. H. G. S.

Method for sampling coal cargoes. F. H. WALKER. *Jour. Soc. Chem. Ind.*, **44T**, 283-5(1925). H. H. S.

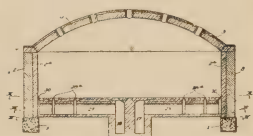
Inorganic constituents of coal. R. LESSING. *Jour. Soc. Chem. Ind.*, **44T**, 277-83(1925). H. H. S.

The constitution of coal. W. A. BONE. *Jour. Soc. Chem. Ind.*, **44T**, 291-9 (1925). H. H. S.

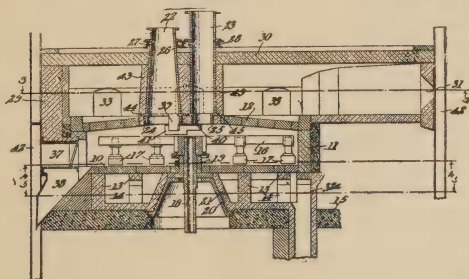
Economic feature of heat-exchanger design. F. L. MAKER AND M. W. THORNBURG. *Mech. Eng.*, **46**, 891-5(1924).—The economical area of a heat interchanger is that area beyond which the cost of additional surface (overhead, maintenance and profit) is more than the value of the heat saved. Equations are derived for solving such problems. Graphic charts are developed for quick solns. (C. A.)

PATENTS

Brickkiln. O. M. REIF. U. S. 1,544,599, July 7, 1925. In a down-draft brick kiln, a floor divided by narrow elongated outlet ports into substantially rectangular sections, said sections being adapted to receive and space apart rectangular stacks of bricks to be fired, and draft passages connecting said ports to an outlet stack.



All-ceramic furnace. O. BEZANSON. U. S. 1,544,798, July 7, 1925. In a furnace of the type for carrying out chem. processes involving the interaction of corrosive mats.



at high temps., the combination of a reaction chamber having a bottom, side walls and a roof of ceramic mat., a combustion chamber including as its bottom the roof of the reaction chamber, a gas pipe and a feed pipe extending centrally up from the reaction chamber through the combustion chamber, and means situated above the combustion chamber for supporting the said pipes.

BOOK

The conversion of coal into oils. F. FISCHER. Trans. and Ed. by R. LESSING. Pp. XIII + 284. London: E. Benn, Ltd., 1925. Price 36s. H. H. S.

Geology

Fluorspar prices. ANON. *Eng. and Mining Jour.*, **119**, 1034(1925).—Conditions are said to be unsatisfactory in the U. S. market, whether judged from the viewpoint of producers or of consumers. The weighted average for all grades is around \$20.00 per ton as compared with \$7.00 before the war, but producers state increasing costs of labor and deep mining have more than offset the higher price. There is said to be much unemployment in the fluorspar mining districts. Consumers are encouraging foreign source of supply, notably a very pure acid-grade feldspar from Transvaal. H. H. S.

The Russian manganese concession. ANON. *Eng. and Mining Jour.*, **119**, 1033-34(1925).—The Mn district of Chiatouri, Russian Georgia, has been conceded to the Harriman Co. of N. Y. There are three chief sources of Mn in the world, India, Russia and Brazil. The U. S. has relatively small Mn resources. H. H. S.

Foshagite, a new silicate from Crestmore, California. A. S. EAKLE. *Am. Mineral.*, **10**, 97-9(1925).—Foshagite, named in honor of W. F. Foshag, was found with vesuvianite, calcite and thaumasite at the Wet Weather quarry. Its properties are: color, snow white; luster, silky; structure, compact fibrous; hardness = 3; sp. gr. = 2.36; analyses gave: SiO_2 33.92, Fe_2O_3 0.83, CaO 53.48, MgO tr., CO_2 1.83, H_2O 10.19, sum 100.25%; formula, $\text{H}_2\text{Ca}_5(\text{SiO}_4)_3 \cdot 2\text{H}_2\text{O}$; fibers have // extinction and + elongation; $\alpha = \beta = 1.594$; γ 1.598; optically +. (C. A.)

Bauxite deposits of British Guiana. L. T. EMORY. *Eng. Mining J.-Press*, **119**, 686-9(1925).—Bauxite occurs through an area along the edge of the foothills from the Essequibo to the Courantyne River. The deposits have been worked since 1917. The bed averages 16-20 ft. in thickness, and the deposit is frequently so uniform in compn. and low in Fe and Si that it can be mined by steam shovel. (C. A.)

An enormous magnesite deposit in Manchuria. HIRONAO NISHIHARA. *Eng. Mining J.-Press*, **119**, 488-9(1925).—Magnesite is being mined 3 miles southeast of Tashihchiao. It occurs in beds alternating with dolomite and slate. Two analyses gave 90 and 96% MgCO_3 . At Pai-Lo-Shan a coarse cryst. mass 780 ft. thick is exposed. An est. of 300 million tons of magnesite above ground level is made. (C. A.)

BOOK

RUMBOLD, W. G.: **Bauxite and Aluminium.** Monographs on Mineral Resources with Special Reference to the Brit. Empire. London: John Murray. 6s. net. (C. A.)

Chemistry and Physics

Potash from sea water. E. NICCOLI. *Giorn. Chim. Ind. Appl.*, **7**, 187-94(1925).—The removal of K salts from sea water is accomplished in three parts. Concentrating to 34-35 Bé., the impure salts separate out. At 37-38 Bé. MgSO_4 of commercial purity is produced. At 42 Bé. MgCl_2 as a solid product is formed of the Stassfurt type. The liquors contain about 20% KCl. The second phase is concentrating the K_2SO_4 and MgSO_4 to 97-98% purity. The third phase is treating with lime and leaving K_2SO_4 of 94-96% purity. A large number of analyses of various sea water as to the compn. of the solid mats. in the water and the percentage of solid material in the water. The process described is used in Tripoli on the Mediterranean and the sun is used to furnish part of the heat for evaporation. S. S. C.

The effect of grinding on the density of quartz. R. B. SOSMAN AND H. E. MERWIN. *Jour. Wash. Acad. Sci.*, **14**, 117-8(1924).—Quartz ground dry to 40mu and finer showed under microscope to still be quartz and after grinding under water it still remains the same. This work was done in an attempt to check the work by Ray who showed the density to be lowered in about $\frac{1}{3}$ of the material which was said to be converted to an amorphous form. S. S. C.

Sodium chromate. N. JOUSHKEVITH. *Trans. Inst. of Economic Mineralogy and Petrology (Moscow)*, No. 13, 1925.—Obtainment of sodium-chromate by roasting of chrome iron ore with calcinated soda and caustic lime. Experiments have been made in order to study influence of temp. on the velocity of production of chromates. Results show formation of chromates at 700°C is rather slow; but is apt to leap at higher temps. At 1160°C it is so great that one-half hour's roasting is sufficient to convert 95% of Cr_2O_3 into chromates. The oxidation of chromium proceeds, under usual industrial conditions, with equal velocity during the whole process of roasting, 7½ hrs. It is therefore evident that the temp. of the mass gradually and constantly increases throughout the opern. A fur. adequately constructed for the roasting of the mixt. should answer the following conditions: (1) the mixt. must be rapidly heated up to 1160°C; (2) the mixt. must be constantly and mechanically stirred; (3) the temp. of the heating gas must not exceed 1260°C. To heat the mixt. rapidly up to 1160°C place it in a shelf-furnace

in thin layers and heat from the upper surface by hot gases directly and through the shelves from the bottom, the stirring being operated continuously. Temp. of the gases to be kept at high range. O. P. R. O.

Measurement of air temperature in closed spaces with thermometers not protected from radiation. H. HAUSEN. *Sci. Abst.*, **28** [4], 308(1925); *Zeits. techn. Physik*, **55**, 169-86(1924).—The paper is concerned with the errors introduced in the measurement of air temp. when freely exposed thermometers are used in the presence of neighboring bodies whose temp. differs from that of the air in which the thermometers are placed. The first section is devoted to a mathematical investigation of the error, taking into account radiating bodies and thermometer bulbs of different sizes and forms. Formulas are obtained for the "radiation error" and its numerical magnitude is evaluated for certain cases. It turns out that it may be quite large. For example, in a room, the walls of which are at a temp. of 10°C , a mercury thermometer with bulb diameter 0.55 cm., will, at a point where the air temp. is 20°C , read about 2.7°C too low. On the other hand, in the presence of a hot surface 1 m. high and broad, with a temp. of 60°C , the same thermometer in air at 20°C will read about 5°C too high at 11 cm. distance from the heated surface, 2°C at 0.4 m. and about 0.25°C at 2 m. distance. Means of reducing or avoiding such errors are next considered. They may be considerably reduced by gilding or silvering the bulb, the reduction being considered numerically in the paper. But the most effective way (apart from using a shielded thermometer, such as an Assmann aspirated thermometer) is to use a pair with bulbs having different radiation constants, such as a plain glass one and a silvered one. A simple formula enables the correction, which must be applied to either to get true air temp., to be deduced from the difference between the readings of the two thermometers. Then follows a section setting out the results of expts. giving satisfactory confirmation of the theory. An appendix includes a consideration of the effect of lighting, either natural or artificial, and of the proximity of the human body when reading. Remarks are also made on the best method of exposing and supporting room thermometers. A. F. G.

Stability of kaolin suspensions. W. O. KERMACK AND W. T. H. WILLIAMSON. *Proc. Roy. Soc. Edin.*, **45**, 59-70(1924-5); *J. Soc. Chem. Ind.*, **44B**, 464(1925).—Comparison was made of the rates of sedimentation of a kaolin suspension in solns. of differing pH value, in presence of varying concns. of each of the following salts: NaCl, KCl, Na_2SO_4 , Na_2HPO_4 , Na citrate, CaCl_2 , CaSO_4 , CaHPO_4 , AlCl_3 , FeCl_3 , LaCl_3 and superphosphate. In general, the metal ion assists the pptg. action of the H ion. NaCl, however, while increasing sedimentation in alk. soln., decreases it in acid soln., and Na_2SO_4 acts similarly, their behavior being ascribed to chemical reaction. The trivalent ions, Al, Fe and La, in acid solns. have very little effect, but a zone of marked flocculation occurs at pH 7-8. Abnormal pptn. occurs with CaHPO_4 and superphosphate in alk. soln., probably due to deposition of basic $\text{Ca}_3(\text{PO}_4)_2$ on the kaolin particles.

H. H. S.

Dispersion and base exchange in clay. G. WIEGNER. *Koll. Z.*, **36**, *Zsigmondy-Festschr.*, 341-69(1925); *J. Soc. Chem. Ind.*, **44B**, 464-5(1925).—The charge on clay particles is ascribed to the presence of a complex silicate anion holding in equilibrium a sheath of cations by residual electrostatic forces. The attractive force on these cations increases with increased valence, and decreases with increased hydration. Ultra microns with heavily hydrated cations like Li and Na are bulky and viscous and resemble hydrophilic colloids; those with less hydrated cations like Ca and Cs are less viscous and resemble hydrophobic colloids. Simple effects of added electrolytes are obtd. only if the added cation is the same as that in the outer sheath of the colloid particle; in other cases flocculation always includes base exchange. Owing to base exchange a small amt. of KCl, added to a large amt. of a calcium clay, has the same

flocculating effect as an equiv. amt. of CaCl_2 , and Schulze's law is thus invalid. The changes in the relative flocculating powers of uni- and bi-valent ions with varied colloid concn. probably depend on changes in the amounts and relative importance of the exchanged bases. H. H. S.

Spectroscopy and its relation to chemistry. H. DINGLE. *Jour. Soc. Chem. Ind.*, **44**, 602-3(1925). H. H. S.

Separation of zirconium and hafnium from titanium, cerium and thorium. L. MOSER AND R. LESSING. *Monatsch.*, **45**, 323-7(1924); *Jour. Soc. Chem. Ind.*, **44B**, 481(1925).—Zr and Hf are separated quantitatively from Ti, Ce and Th, by pptn. as basic arsenate from strong HNO_3 soln. contg. H_2O_2 by addn. of sodium arsenate. H. H. S.

Critical studies on methods of analysis. XV. Magnesium. L. A. CONGDON AND G. VANDERHOOK. *Chem. News*, **130**, 241-3, 258-61, 273-6(1925); *Jour. Soc. Chem. Ind.*, **44B**, 480(1925). H. H. S.

Gravimetric determination of aluminum and its separation from manganese by "infusible white precipitate" (ClHgNH_2). B. SOLAJA. *Chem. Zeit.*, **49**, 337-8(1925); *Jour. Soc. Chem. Ind.*, **44B**, 480(1925). H. H. S.

Magnetic ferric oxide. H. ABRAHAM AND R. PLANIOL. Meeting Fr. Acad. Sci., May 4. *Nature*, **115**, 930(1925).—Ordinary Fe_2O_3 (colcothar) is non-magnetic, but if Fe_3O_4 be heated in air at 200-250°C so that oxidation proceeds slowly and without incandescence, the resulting Fe_2O_3 is brown and strongly magnetic. At 700° this oxide becomes red and non-magnetic. H. H. S.

Separation of celium and zirconium. M. MARQUIS, P. URBAIN AND G. URBAIN. Meeting Fr. Acad. Sci., May 11. *Nature*, **115**, 930(1925).—Fractional pptn. with satd. solns. of Na_2CO_3 gives the best separation. H. H. S.

Colorimetric determination of hydrogen-ion concentration. E. RICHARD. *J. Pharm. Chim.*, **1**, 328-33(1925); *J. Soc. Chem. Ind.*, **44B**, 480(1925).—Equal vols. of an appropriate one-color indicator are added to 10 cc. of the sample and to 10 cc. of $\text{N}/100$ NaOH . After 2 or 3 min., the colors are compared in a colorimeter, and the pH is calcd. from the formula $\text{pH} = K + \log E/(e - E)$, where E is the colorimeter reading for the NaOH , e the reading of the sample, and K a const. depending on the indicator. A series of constants are given for indicators ranging from pH 2.2-12.0. If $E/(e - E)$ is less than unity, the formula $\text{pH} = K - \log (e - E)/E$ is used instead of the above. H. H. S.

The photography and measurement of fine particles. HENRY GREEN. *J. Ind. Hyg.*, **7**, 155-65(1925). (C. A.)

Solid solutions. G. BRUNI. *Chem. Rev.*, **1**, 345-75(1925).—A lecture, reviewing the historic development and the present state of knowledge under the following headings: Diffusion in the solid state, heat of formation, constitution of solid solns., applicability of the law of solns. to solid solns., solid solns. and chem. combination. Numerous references are given to original papers. (C. A.)

Bentonite as a one-dimensional colloid. E. T. WHERRY. *Am. Mineral.*, **10**, 120-3(1925).—Bentonite contains plates of a biaxial substance, having microscopic breadth, but probably colloidal thickness. The characteristic swelling, adsorptive power for dyes, and plasticity of bentonite may well be due to this peculiar dimension-relation of the grains and the consequently great surface exposed. (C. A.)

Studies of living organisms from the point of view of geochemistry. V. I. VERNADSKII. *Bull. acad. sci. Russie*, **1921**, 120-3; cf. *C. A.*, **17**, 2099.—During the investigation of the decompn. of clays by living organisms, a culture of *Nitschia* was isolated. It seemed to have a definite action on soils. V. recommends detns. of the metal and rare earth content of living organisms. (C. A.)

A tabulation of the aluminium silicate minerals. E. T. WHERRY. *Am. Mineral.*, **10**, 140-5(1925).—A series of Al silicate minerals is plotted in a new type of triangular diagram, the minerals being selected on the basis of their Si:Al ratios falling into the harmonic series N-3. Colloidal, meta-colloidal and crystd. representatives of each ratio are given as probably comprising the existent mineral species. Dana's bauxite, schrotterite and montmorillonite are omitted, but many of his varieties are made species. Some of the new species are quite abundant. Further work on correlating optical and chem. properties in such minerals is needed. (C. A.)

Dissociation of magnesium carbonate in stages. M. TZENTNERSHVER AND B. BRUZS. *Z. physik. Chem.*, **114**, 237-50(1924).—The thermal dissociation of magnesite has been studied by a dynamic method (cf. C. A., **18**, 3501), which permits of a complete sepn. of the dissociation products. The substance is heated in a Ni boat in an elec. furnace, and the temp. and pressure are measured. The dissociation temp. is detd. from the form of the heating and cooling curves. Kahlbaum's pure MgCO_3 , which had been dried for 3 days at 220° , in a stream of CO_2 began to dissociate at 270° , but on repeating the test the dissociation temp. rose to 368° . Water vapor came off during the expt., and it was shown that the disagreement was due to the presence of water of constitution in the sample of carbonate. The sample dried at 220° was therefore further dried at 320° in a stream of CO_2 for 3 days. The carbonate thus prepd. dissociated according to the following stages: (1) $2\text{MgCO}_3 = \text{MgO} \cdot \text{MgCO}_3 + \text{CO}_2$; dissociation temp. 373° , under atm. pressure. (2) $2[\text{MgO} \cdot \text{MgCO}_3] = 3\text{MgO} \cdot \text{MgCO}_3 + \text{CO}_2$; dissociation temp. 442° . (3) $3\text{MgO} \cdot \text{MgCO}_3 = 4\text{MgO} + \text{CO}_2$; dissociation temp. 469° . With natural rhombic magnesite, the stages were as follows: (1) $4\text{MgCO}_3 = \text{MgO} \cdot 3\text{MgCO}_3 + \text{CO}_2$; dissociation temp. 402° . (2) $\text{MgO} \cdot 3\text{MgCO}_3 = 2[\text{MgO} \cdot \text{MgCO}_3] + \text{CO}_2$, or $2\text{MgCO}_3 = \text{MgO} \cdot \text{MgCO}_3 + \text{CO}_2$; dissociation temp. 437° . (3) $\text{MgO} \cdot \text{MgCO}_3 = 2\text{MgO} + \text{CO}_2$; dissociation temp. 480° . The first dissociation product of magnesite, monoxycarbonate, is metastable. Expts. in which the completely or partially dissociated carbonate was heated in a stream of CO_2 between 200° and 230° showed that under these conditions the reverse formation of carbonate takes place extremely slowly. (C. A.)

BOOKS

A catalogue of British scientific and technical books, covering every branch of science and technology, carefully classified and indexed. Compiled by British Science Guild. New Ed., pp. xxii + 489. London: A. & F. Denny, Ltd., 1925. Price 12s. 6d. H. H. S.

Wolfram. H. ALTERTHUM. Pp. vii + iii. Brunswick: F. Vieweg u. Sohn, 1925. Price 4.50 M. Deals with the production and industrial application of tungsten, its alloys and compounds. H. H. S.

Tables annuelles de constantes et données numériques de chimie, de physique et de technologie. Vol. V. Pt. I. By commission permanente du Comité international. Paris: Gauthier-Villars & Co. Chicago: Univ. of Chicago Press. 804 pp. \$25 (parts 1 & 2). Reviewed in *Mech. Eng.*, **47**, 389(1925).

WELLINGS, A. W.: Chemical Symbols, Formulas and Calculations. London: Meuthen & Co. 104 pp. 3s. 6d.

PATENT

Process of making aluminum chloride. ALMER McDUFFIE MCAFEE. U. S. 1,544,328, June 30, 1925. The herein described process of making aluminum chloride which comprises treating aluminum containing mats. with chlorin in the presence of an activated carbon.

General

Operating the English clay pit. W. BARNES. *Brick and Clay Record*, **66** [8], 584-8(1925).—This is a complete description of the English clay winning methods

illustrated with a number of photographs. Oxford clay is the most important deposit of brick clay in England. At Peterboro and Bedford, beds over 100 ft. in thickness are being worked. The clay contains oil which greatly assists the firing. The capacity of the average English brick machine is from 100,000 to 120,000 brick per week. The smallest factory where it pays to use a mechanical excavator is one producing from 60,000 to 80,000 brick per week, requiring from 180 to 240 cu. yds. of mat. The smallest shovel in use is the three quarter cu. yd. With this shovel the depth of the working fan should not be greater than 25 ft. An interesting feature about the British design of excavator is the duplex rail wheels which dispense with the jack screws. The portion of the wheels near the framing is arranged for running on the standard 4 ft., 8½ in. gage track, whereas the outer edge of the wheel has double flanges to enable the mach. to run on a gage of about 6 ft. 6 in.

P. D. H.

Government tests and purchases. ANON. *Brick and Clay Record*, 66 [8], 580 (1925).—This article tells advertisers how they may properly refer to the Army, Navy or Bureau of Standards, to avoid misrepresentations or violations of policy. P. D. H.

The advancement of the French ceramic industry by the industrial management agreement between France and Germany. ANON. *Tonind. Zeit.*, 49 [38], 534 (1925).—The importance of the change in the general tariff on German ceramic wares is shown by the following: (1) The development of the French ceramic industry whose capacity is three times that of prewar times. (2) The influence of the important factories in Alsace-Lorraine. (3) The condition of the Belgian industry which coöperates with the French.

F. G. J.

The hazard of carbon monoxide to the public and to the industry. S. H. KATZ. *Ind. and Eng. Chem.*, 17 [6], 555 (1925).—Carbon monoxide is likely to exist anywhere. It is insidious and asphyxial in character. Proper regulation of burners will reduce the amount formed. Small amounts in the air can be detected by a simple color test. Two new devices have been developed by the Bureau of Mines for the protection of persons obliged to work in the presence of carbon monoxide. Other results of recent research include a treatment for resuscitating persons overcome by this gas and the development of a simple test for determining carbon monoxide asphyxiation. F. G. J.

Radial distribution of certain elements in the earth. H. S. WASHINGTON. *Jour. Wash. Acad. Sci.*, 14, 435–42 (1924).—The center of the earth has a ferro-nickel core which is surrounded by a course of nickel, iron and silicate. The silicate usually is olivine $2(\text{FeMg})\text{OSiO}_2$. This "lithosporic" shell changes to a "ferrosporic" with a metal content of not over 15%. Next is a 60–100 kilometer "crust" which is a mixture of $\text{CaOAl}_2\text{O}_3\text{2SiO}_2$ and $\text{Na}_2\text{OAl}_2\text{O}_3\text{6SiO}_2$. In the lower part of the crust little or no K_2O and Na_2O are present. The order of occurrence of substances from the surface is K, Na, Ca, Mg, Al, Fe and Ni.

S. S. C.

PATENTS

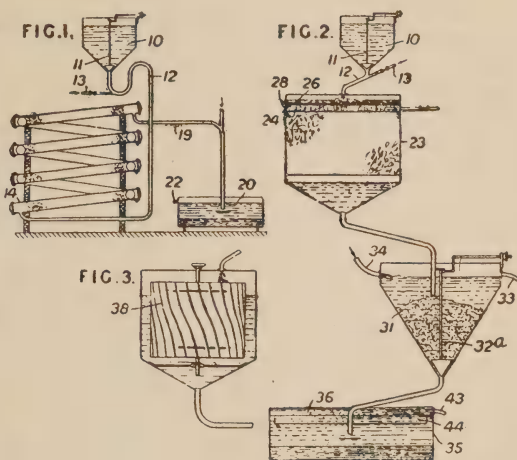
Process of treating colloidal clay. ERNEST C. BIERCE. U. S. 1,544,210, June 30, 1925. The process of treating colloidal clay to produce a filtering and decolorizing mat. comprising drying the lumps of clay as they come from the quarry without any preliminary grinding or addition of water until its free water content is reduced to approx. 12%, adding mineral acid in the proportion of approx. 4% to the clay, further drying to reduce the free water content to about 5%, comminuting the clay to pass through a coarse mesh screen, adding 1% of mineral acid, screening the clay to separate the finer particles suitable for the contact process of filtration from the coarser particles suitable for the percolation method of filtration.

Bleaching kaolin and the like. R. F. B. GAUDIN and DARTMOOR CHINA CLAY CO., LTD. Brit. Pat. 9964 (1923). The treatment of kaolin or the like with a solution of sulphurous acid in presence of a metal such as zinc to remove impurities is effected

by causing a suspension of the kaolin to flow over an extended surface of zinc. The pulp from a container 10 may be fed by a valve 11 through a pipe 12 having an inlet 13 for sulphurous acid, and leading to the bottom of a series of connected inclined tubes 14 filled with pieces of zinc.

The treated pulp is withdrawn by a pipe 19 to a settling tank 20 having an overflow 22. Alternatively the pulp may be fed to a chamber 23 containing a distributing device comprising pivoted perforated plates 24, 26, Fig. 2, one plate 26 being operable by a handle 28 to vary the size of the openings. The pulp then passes through a body of scrap zinc resting upon a false bottom and thence to a washing vessel 31 which receives wash water at 34 and overflows at 33. The pulp settling in the conical part of the vessel 31 is discharged by a valve 32^a to a settling vessel 35.

The settling chamber 35 has an inwardly turned edge 36 extending over the edges of a tray 44 immersed in the pulp and covering the depositing clay. The overflow 43 is above the edge 36. In another modification, the suspension is passed through a vessel containing a grid or structure 38, Fig. 3, of zinc.



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Abrasives

Creation and development of the art of grinding. DONALD WILHELM. *The Glassworker*, 44 [43], 15(1925).—A history of the Norton Co. F. G. J.

PATENTS

Abrasive form, its composition and method of making the same. PAUL KEEVER. U. S. 1,548,145, Aug. 4, 1925. A compn. of matter for making abrasive forms adapted to be set permanently by baking and to be subjected to baking heat immediately on being formed, comprising an abrasive, glass, clay, a dry sodium silicate and a temporary binder.

Abrasive form and process of making the same. PAUL KEEVER. U. S. 1,548,146, Aug. 4, 1925. A compn. of matter for making abrasive forms adapted to be set permanently by baking and to be subjected to baking heat immediately on being formed, comprising abrasive grains, feldspar and clay, and a temporary binder, containing sufficient water to make the mass moldable, but only such an amt. of water that the mass is capable of absorbing moisture from a wet hand.

Process of treating latex and article therefrom. MERWYN C. TEAGUE. U. S. 1,550,466, Aug. 18, 1925. The process of treating latex which comprises thickening and stabilizing the latex by adding thereto an easily decomposable colloidal silicate in the presence of an alkali.

Art

PATENTS

Liquid gold containing a nickel salt. ICHITARO SHOJI. Japan. 1,937, Oct. 22, 1924.¹ Nickel resinate is used as a constituent of liquid gold. S. K.

Process of decorating pottery with liquid luster. NIPPON TOKI CO. Japan. 61,198, Sept. 15, 1924. To retard the drying of liquid luster for over-glaze decoration of pottery, clove or any other suitable oil is added to it. Two or more liquid lusters of different colors are made to flow in stripes on the surface of a pottery. Neighboring stripes will touch each other at points where the 2 liquids will be mingled soon. Then before the surface is completely dried, alcohol, ether or any other volatile liquid is made to fall in drops or painted on it. Surface tension of the liquid will produce spots. Then it is fired in a muffle kiln. The flow-painting is repeated and the spotted portions are painted with a liquid luster. The pottery is fired again in a muffle kiln. S. K.

¹ NOTICE: The revised patent law of the Japanese government took effect from Jan. 11, 1922 and new patent numbers began in 1924; therefore there are two series of the number in that year,

Process of decorating pottery with gold. NIPPON TOKI Co. Japan. 61,199, Sept. 15, 1924. A pottery is first decorated by transferring any design on its varnished surface with pigments other than gold on it. It is fired at 800–850°C. It is then painted with 3–5% gelatine soln., decorated by means of a gold transfer of special design and fired again at 600–850°C. S. K.

Process of manufacturing liquid gold. KUMATARO FUJIYOSHI. Japan. 2,602, Dec. 12, 1924. Gold, bismuth and cadmium are dissolved in aqua regia. The soln. is evaporated to dryness. Sulphureted balsam, resin, lavender oil, rosemary oil and nitrobenzene are added to the residue. S. K.

Black pigment for pottery. SHUICHIRO KATO. Japan. 2,913, Jan. 17, 1925. Small amts. of quartz and cobalt oxide are added to ferro-vanadium. The color is stable in fire and produces a nice bright black. S. K.

Filling material for potteries. KAZUO ANDO. Japan. 62,178, Jan. 28, 1925. A mixt. of 3 pts. of graphite and 4 pts. of lead-powder is heated up to 340–400°C and stirred well with addition of 3 pts. of sulphur. The fused mass is left to cool. To fill a hole in a pottery, that portion is heated by oxy-hydrogen flame until the glaze begins to melt. Then a small amt. of the material is put on the portion. It will melt soon and fill the hole. S. K.

Method of producing crystalline designs on biscuits. NAGOYA SEITOSHIO. Japan. 62,162, Jan. 27, 1925. Pottery body is granulated by stirring its powder with water. The granules are covered with powdered pigments and pressed in a mold. The surface of the pressed ware is partly or wholly shaved with a knife or spatula and it is pressed again. Then it is fired. The ware may be fired without shaving, and polished afterward. S. K.

Under-glaze decoration of potteries by means of pasted pattern-paper. JIMPEI WAKABAYASHI. Japan. 3,898, March 25, 1925. Thin papers with patterns of rice-starch or gum arabic are stuck on the surface of a soft biscuit. It is then moistened with water and painted with pigments. The pigments permeate the paper and decorate the pottery. S. K.

Process of producing luster on glazed potteries. SHIGETA KANASHIMA. Japan. 62,280, Feb. 5, 1925. Buttons, beads or other glazed wares are fired in a kiln and drawn out while they are still 500–600°C hot; or the wares may be reheated after firing. The hot wares are then put into powder of volatile metallic compd., such as arsenious acid, chloride or nitrate of bismuth, tin, iron, copper, strontium, uranium, cobalt, chromium, gold, silver or platinum. S. K.

Process of producing luster on biscuit, glass or enameled ware. SHIGETA KANASHIMA. Japan. 4,430 (Supplement to Pat. 62,280), April 22, 1925. Hot biscuit, glass or enameled ware is brought into contact with arsenious acid, chloride or nitrate of bismuth, tin, iron, copper, strontium, barium, uranium, cobalt, chromium, gold, silver or platinum to produce a luster on its surface. S. K.

Method of manufacturing liquid gold. JIRO ISHIKAWA and REIZO HATTORI. Japan. 4,191 (Supplement to Pat. 35,932), April 10, 1925. Sulphureted balsam is added to a soln. of gold chloride and the mixt. is heated on a water bath. Gold resin sulphide, thus prepd., is washed and dried. Then resinates of rhodium and bismuth or those of rhodium, bismuth, aluminium and chromium are added. The product is dissolved in a mixt. of refined oils. S. K.

Process of manufacturing liquid gold. TOSAKU YOSHIOKA. Japan. 4,425, April 22, 1925. Gold balsam sulphide, obtained by treating a soln. of gold chloride with sulphureted balsam, is washed, dried and made into a viscous soln. with a solvent. Liquid gold is prepd. by adding cobalt resinate to it. S. K.

BOOK

Colour and Methods of Colour Reproduction. L. C. MARTIN. With chapters on Colour Printing and Colour Photography by W. GAMBLE. London: Blackie & Son, Ltd. 187 pp. 12s. 6d. Reviewed in *Chemistry and Industry*, **44**, 489(1925).

(C. A.)

Cement, Lime and Plaster

On the method of determining final set. K. SHIODA AND S. KAJIWARA (Comm. of Cement Specif.). Jap. Assoc. of the Port. Cement Engineers, *Report* **16** [1], 18 pp. (1924).—According to the Jap. Port. Cement Specif., the final setting is said to have finished when the Vicat needle cannot penetrate the mass at all. The Comm. recognizes the grave objections to the method and recommends, after long invest., to consider the final setting finished the moment the needle sinks about 0.25 mm. into the mass.

S. K.

On the revision of the method of determining setting time in the Cement Specifications. K. SHIODA AND S. KAJIWARA (Comm. of Cement Specif.). Jap. Assoc. of the Port. Cement Engineers, *Report* **16** [4], 82 pp. (1924).—Results of the elaborate invest. on the influence of temp. on the setting time are described. In conclusion, the Comm. proposes to specify the temp. in the detn. of the setting time as 15–25°C. The present specif. has no description on it.

S. K.

On the determination of magnesia in Portland cement. KATSURO MIZOBUCHI (The Onoda Cement Mfg. Co.). Jap. Assoc. of the Port. Cement Engineers, Supp. to *Report* **16** [1], 16(1923).—*A. Care to be taken in the detn. of silica and lime.* (1) The silica residue must not be heated over 110°C. (2) Excess of ammonia has to be avoided in the pptn. of calcium. The ppt. must be filtered in 4–5 hrs. after pptn. and be washed with water contg. ammonium oxalate. *B. Treatment of the filtrate from lime detn.* Slightly acidify the filtrate and evap. it to about 100 cc. Add about 30 cc. of satd. soln. of ammonium chloride (15°C), neutralize with ammonia and add about 10 cc. of ammonia (sp. gr. = 0.892). *C. Pptn., filtration and washing.* Add about 5 cc. excess of satd. Na_2HPO_4 soln., then 40–50 cc. of 10% ammonia. Stand in cold place for a night and filter. Wash the ppt. with 2.5% ammonia. *D. Ignition.* Do not use nitric acid in igniting the ppt. of magnesium.

S. K.

On the relation between fineness and strength of Portland cement. SHIGETSUGU INOKUCHI (The Asano Cement Co.). Jap. Assoc. of Port. Cement Engineers, Supp. to *Report* **14**, 17–25(1923).—Tensile strength of neat Port. cement briquettes increases with its fineness until a certain limit is obtained, beyond which it begins to decrease. Such a limit is shown with a Japanese clinker when it is ground to leave 6% residue on 4900-mesh per sq. cm. Tensile and crushing strengths of 1:3 mortar briquettes increase with fineness of the cement.

S. K.

On the addition of volcanic ash to Portland cement. KI SHOJI. *Jour. Jap. Ceram. Assoc.*, **33** [386], 41–56(1925).—*I. Introduction.* The effect of volcanic ash in Port. cement mortar for marine constructions owes probably to the formation of the hydrated lime compds. from sol. silicic acid in volcanic ash and calcium hydroxide from the cement and also to the action of the hydrated lime compds. which fill the pores in the constructions and make them waterproof. *II. Kind and proportion of volcanic ash.* The effect of mixing 0–200% of 5 different volcanic ashes to slow setting Port. cements on their setting time is reported. The results may be classified as follows: (1) Retardation of only final set, (2) excessive acceleration of initial set as well as retardation of final set and (3) excessive acceleration of both initial and final sets. Of 5 volcanic ashes, only *A* belonged to (3); *e. g.*, its 20% changed the initial and final sets of a cement, 5.23 and 9.33, to 0.04 and 1.37 (hr.-min.) resp. *III. On the volcanic ash.* *A.* Anal. of the 5 volcanic ashes are as follows:

Treated with NaOH and HCl solns.

| | Moist. | Ig. loss | Soln. SiO ₂ | Soln. Al ₂ O ₃ | Soln. Fe ₂ O ₃ | Soln. CaO | Soln. MgO | Alkalis |
|---|--------|----------|------------------------|--------------------------------------|--------------------------------------|-----------|-----------|---------|
| A | 4.45 | 14.81 | 33.26 | 28.03 | 8.30 | 0.57 | 1.03 | 1.92 |
| B | 1.62 | 6.19 | 38.16 | 14.56 | 2.31 | 1.14 | 0.63 | 5.64 |
| C | 3.63 | 10.10 | 45.21 | 11.75 | 1.91 | 1.32 | 0.77 | 4.81 |
| D | 0.80 | 1.83 | 22.92 | 7.20 | 1.64 | 2.72 | 0.44 | 3.95 |
| E | 2.43 | 6.29 | 30.20 | 11.27 | 4.67 | 2.44 | 1.15 | 5.68 |

The abnormal acceleration of *A* is probably due to its high content of sol. alumina. The author treated *A* and *B* with a soln. of caustic soda, acidified the solns. with HCl and finally obtained ppts. of silicic acid and alumina with ammonia, whose anal. are as follows:

| | Ig. loss | Silica | Alumina |
|--------------------|----------|--------|---------|
| Ppt. from <i>A</i> | 27.82 | 35.04 | 34.84 |
| Ppt. from <i>B</i> | 25.94 | 45.70 | 26.62 |

The action of these ppts. on a cement was as follows: (Temp. of room = 20.5° C).

| | Port. cement | Port. cement + 4 % | Port. cement + 4% ppt. from <i>A</i> | Port. cement + 4% ppt. from <i>B</i> |
|------------------------|--------------|--------------------|--------------------------------------|--------------------------------------|
| Water (%) | 25.0 | 32.2 | 25.5 | 25.5 |
| Initial set (hr.-min.) | 3.13 | 0.03 | 0.03 | 0.38 |
| Final set (hr.-min.) | 5.23 | 0.08 | 0.22 | 3.13 |

IV. Influence of SO₃ in cement on the action of volcanic ash. The author studied the action of *A* on typical Jap. Port. cements with the result that the av. content of SO₃ in nine cements whose setting were accelerated by *A* is 1.16%, while that in nine cements which remained slow setting is 1.35%. He also found that the former kind of the cement can surely be changed to the latter by adding gypsum so as to make its content in SO₃ about 1.6%. S. K.

Scientific basis of lime-burning practice. G. KEPPELER. *Z. angew. Chem.*, **38**, 397-405(1925).—Theoretical considerations in *lime burning* are discussed. The yield of CaO should be 56% of the CaCO₃ used. If instead of 56%, the yield is *A*%, the quantity of unburned lime is $(A - 56)100/44 = 2.28(A - 56)$, and the quantity of completely decomposed lime is $100 - \{2.28(A - 56)100\}/A$. Since the sp. gr. of CaO = 3.08, and of CaCO₃ = 2.72, the CaO should occupy only about 50% of the original vol. of the limestone, but it is very porous and the shrinkage in vol. amts. to only 10-12%. CaO really exists in 2 forms: amorphous, with sp. gr. 3.08, and cubically cryst. with sp. gr. 3.40 and refractive index 1.83. The first is stable at lower temps., changing into the second at 400-430°. A diagram is given by which all other constituents can be detd. from the CO₂ content. This is assuming no excess of air and theoretical yields, whereas in practice the CO₂ content of the gas is usually between 15% and 35%, with a gas vol. of 3-10 cu. m. per kg. of limestone burned at 900°. The decompn. tension of CaCO₃ is plotted against temp. The temp. of the reaction can be considerably lowered by the addition of reducing materials such as coal or org. matter. They disturb the equil. by reducing the CO₂ to CO. H₂O vapor accelerates the reaction. The nature of the limestone used is important, particularly if other carbonates are present which have a lower decompn. pressure than CaCO₃. Formerly the furnace lining was always basic in nature, but there is now a tendency to use acid lining. However, the acid material shows greater vol. change with change in temp. and is therefore more brittle. (C. A.)

PATENTS

Manufacture of white hydraulic cement. IRA JUDSON COE. U. S. 1,547,365,

July 28, 1925. A white hydraulic cement consisting of the sinter and ground mix of an iron-free limestone and an iron-free labradorite.

Method of fire-proofing safes. RIUKICHI AONE. Japan. 61,443, Oct. 22, 1924. A mixt. of 50–60 pts. Kokaseki (a pumice produced in the Shizuoka Prefecture), 10–20 pts. asbestos and 10–20 pts. slag cement is kneaded with water, brine or soln. of other salt. Plates made of the plastic body are used for fire-proofing safes. S. K.

Manufacture of lime-sand concrete and bricks, pipes, and the like. ANON. Brit. 222,923. *Quarry and Surv. and Contractors' Jour.*, 30, 205(1925). The invention consists in mfg. lime-sand mixts. by adding a predetd. amt. of sulphuric acid to the sand-lime mixt. The process may further be improved by adding coal or other tar to render the product anhydrous so that it will absorb a minimum quantity of water and effect a better and quicker hardening and more effective internal adhesion. O. P. R. O.

Enamels

PATENT

Process of rust-proofing pins for porcelain teeth. KAJO SHOFU. Japan. 2,600, Dec. 12, 1924. In the process of fixing a pin, which is made of nickel or an alloy and may be gilded or not, to a porcelain tooth, the exposed portion of the pin is coated with a fusible compd. The coating is melted later in firing. S. K.

Glass

Additional epochs in manufacture of Glass. ANON. *Nat. Glass Budget*, 41 [14], 9 (1925).—Reprints an article of twenty years ago on epochs of glass making and describes the advances since then. F. G. J.

Old Sandwich glass factory's centenary. ANON. *Pottery Glass & Brass Salesman*, 31 [23], 13(1925); *The Glass Worker*, 44 [40], 13(1925).—An account copied from the Boston Herald by B. Burgess of the methods and manners of life of the glass workers there in the 80's when she visited it as a child. The factory has been closed since 1888. F. G. J.

Thorough and practical training in common sense and fundamentals to be aim of glass laboratory. J. M. HAMMER. *The Glass Worker*, 44 [44], 15(1925).—An interview with A. Silverman on the plans and aims of the Lab. of Glass Tech. at the Univ. of Pittsburgh. It will be a part of the Dept. of Chemistry in the new "Cathedral of Learning." The aim will be to prepare men who can be of the highest service to the glass indus. With a knowledge of chemistry will be combined practical training in glass factories. F. G. J.

Chemical and thermal resistance of laboratory glasses. ARNALDO MAURI. *Atti congresso naz. chim. ind.*, 1924, 330–40; cf. *C. A.*, 18, 2063.—Tests were carried out on 7 important glasses, viz., old green label Jena (I), 1920 Jena (II), 1922 Italian Murano (III), 1923 Murano (IV), original Pyrex (V), French Labo (VI) and Belgian Boromica (VII) to det. their resistance to reagents and to sudden chilling. A comparison of the quant. results with their compn. shows best the effect of various constituents. In the 1st series the glass was heated in an autoclave at 120° for 3 hrs. The following data give the loss in mg. with 300 cc. of soln. in 500-cc. flasks for the 7 glasses: H₂O 0.5, 0.4, 0.6, 0.5, 0.4, 0.7, 0.6; 0.1 N HCl 2.6, 2.1, 2.5, 2.2, 2.0, 2.5, 2.3; 0.1 N NH₄OH 9.6, 9.5, 9.5, 9.8, 9.7, 10.0, 11.2; 0.1 N NH₄Cl 3.4, 2.0, 3.6, 2.0, 1.8, 2.1, 3.6; 0.1 N (NH₄)₂CO₃ 3.7, 4.0, 3.5, 3.5, 4.2, 4.1, 4.3; 0.1 N NaOH 81.1, 123.0, 80.5, 107.8, 229.0, 84.3, 82.0; 0.1 N Na₃PO₄ 12.0, 9.0, 10.5, 11.5, 13.5, 10.8, 10.7; 0.1 N Na₂CO₃ 45.6, 72.0, 44.0, 68.0, 101.3, 47.2, 46.0; 0.1 N Na₂S 90.0, 75.2, 89.9, 84.0, 75.5, 94.1, 93.0. In further tests the solns. were boiled for 2 hrs. in the open. The losses were: N HCl 3.3, 2.0, 3.1, 2.5, 2.0, 3.1, 3.0; 0.1 N HCl —, 1.0, 3.5, 2.0, 0.9, —, —; 0.1 N HNO₃ —, 0.8, 1.2, 0.9, 0.7, —,

—; 0.1 N H_2SO_4 —, 1.0, 1.1, 1.2, 0.5, —, —; 0.1 N $(CO_2H)_2$, 0.1 N H_2S , satd. aq. SO_2 and 0.1 N NH_4OH —, 0, 0, 0, 0, —, —; N NH_4OH —, 4.3, 4.2, 2.5, 2.8, —, —; N NH_4Cl 0.3, 0.2, 0.5, 0.2, 0.1, 0.4, 0.5; N $(NH_4)_2CO_3$ —, 1.5, 1.0, 1.0, 2.0, —, —; 0.01 N $NaOH$ 10.0, 13.0, 9.0, 10.7, 19.5, 10.5, 10.0; 0.1 N Na_3PO_4 —, 1.5, 3.0, 2.3, 2.0, —, —; 0.1 N Na_2CO_3 14.8, 17.6, 14.5, 17.5, 24.0, 16.3, 15.0; 0.1 N Na_2S 9.5, 6.1, 6.0, 6.5, 7.4, 13.3, 12.5; 0.1 N $(NH_4)_2S$ 2.6, 1.6, 1.8, 2.5, 2.2, —, —. In expressing resistance to reagents, the customary units involving loss per vol. should be replaced by the more rational *loss per unit area of surface exposed*. Since evapn. and ebullition cause a continual variation in this surface area, accurate resistance tests should always be done in an autoclave. It would be of great advantage if data were available for every type of glass to give *correction coeffs.* which would represent the losses in various reagents at different concns. and temps. for a given time. In illustration of this the following data give the corrections to be applied to the 7 glasses in quant. analysis, based on a 500-cc. flask with 300 cc. of soln. boiled over a flame for 30 min.: H_2O all 0; N HCl 1.0, 0.5, 0.5, 0.4, 0.3, 1.0, 0.9; N NH_4OH 1.0, 1.4, 1.0, 1.3, 1.5, 1.6, 1.5; 0.01 N $NaOH$ 3.0, 4.5, 2.5, 4.3, 6.0, 4.2, 4.0; 0.1 N NH_4Cl —, —, 0.1, —, —, —, —; 0.1 N Na_3PO_4 0.1, —, 0.1, —, —, 0.2, 0.1; 0.1 N $(NH_4)_2CO_3$ —, 0.1, —, —, 0.1, —, —; 0.01 N Na_2CO_3 1.1, 1.2, 1.1, 1.3, 1.6, 1.4, 1.2; 0.01 N Na_2S 1.3, 1.1, 2.0, 1.2, 1.1, 2.7, 2.5. On repeating the same treatment the losses decrease progressively, so the data are comparative only. On chilling from 150° to 15° , **V** and **IV** gave excellent results, **III**, **I**, **II** and **VII** were less resistant but were good and **VI** was poor. The analyses showed the samples to contain in %: SiO_2 64.5, 75.5, 66.0, 78.0, 81.0, 67.5, 64.0; B_2O_3 10.8, 8.65, 10.0, 10.0, 12.0, 5.0, 13.0; Al_2O_3 4.4, 4.7, 6.4, 4.8, 2.5, 0.6, 5.5; ZnO 11.1, —, 10.1, —, —, 6.0, 10.1; CaO 0.6, 0.9, 1.1, 2.4, 0.0, 5.7, trace; Fe_2O_3 0.2, 0.35, 0.3, 0.2, 0.2, 0.3, 0.35; BaO 0.0, 4.5, 0.0, 0.0, 0.0, 0.0, 0.0; Na_2O 7.5, 4.8, 6.0, 4.2, 4.5, 6.5, 7.1; K_2O 0.4, 0.6, 0.0, 0.0, 0.0, 4.9, 0.0. (C. A.)

The crystallization of glasses. Paving with crystallized basic glasses. A. BIGOT. *Rev. universelle mines*, **5** [7], 246–57(1925).—A general description of the physics and chemistry of glass, with analyses of 8 types. An illustrated description is also included of the *sources and properties of basic glasses* (cf. C. A., **17**, 2769) from slags, scoria, etc. which have become of use as flagstone and paving materials. (C. A.)

Polymorphism and tempering of glass. Preliminary communication. A. A. ЛЕБЕДѢВЪ. *J. Russ. Phys. Chem. Soc., physical sect.*, **50**, 57(1921).—There is a sudden change of properties of glass at temps. 540 – 600° , as proven in the study of heating curves and changes of double refraction and coeff. of expansion with the temp. This change is attributed to a polymorphous transformation closely allied to the transformation $\alpha \rightleftharpoons \beta$ quartz. Glasses are assumed to be an aggregation of highly dispersed crystals among which quartz crystals also are present, probably in the form of solid solns., as a result of which the transformation takes place over a certain temp. interval, the glass passing through a no. of equil. states. This explains the difference in glasses tempered at different temps. and which cannot be explained by internal strains alone. Internal strains are some of the results of polymorphous transformations which are accompanied by vol. changes. Changes of the coeffs. of refraction and expansion have been studied by new methods which have been described in detail. (C. A.)

The conductivity of annealed and unannealed soda-lime glasses. M. J. MULLIGAN. *Trans. Roy. Soc. Canada*, **18** [III], 120–1(1924).—The conductivities of annealed and unannealed soda-lime glass exhibit a marked difference (approx. 200%). The conductivities are the same kind of function of the temp. in both cases, so that the change in glass brought about by annealing is one of degree rather than of kind. Detns. were made of the wts. of materials that were electrolyzed into these glasses at 180° from a molten anode (KNO_3 and $AgNO_3$). The amts. were approx. inversely proportional to the resistance of the glasses, but the depth of penetration of Ag ions does not bear

out the assumption that there is a marked difference in the degree of ionization of the 2 glasses. The major factor in increasing resistance by annealing is a decrease in the mobilities of the ions. (C. A.)

Surface layers on glass. R. SISSINGH. *Physica*, **5**, 77-83(1925); cf. *Arch. Néerl.* **8** [IIIA], 142(1924).—Light rays reflected by an old glass prism showed considerable elliptical polarization due to a surface layer of appreciable thickness (d). By a modification of the older theories of Cauchy and of van Ryn van Alkemade it is possible to calc. d . In the sample mentioned, 3.0×10^{-6} mm. was found, after grinding 1.0×10^{-6} mm. The first layer probably consisted of water, the last of air. (C. A.)

Mechanical strength of porcelain insulators. A. O. AUSTIN. *Elec. World*, **85**, 1253-5(1925).—A well designed insulator is a compromise between working load, ultimate test strength and thermal stress. A. discusses at length the various problems connected with the manuf. of the modern insulator. (C. A.)

Viscosity measurements with glass. V. H. STOTT, EDITH IRVINE AND D. TURNER. *Proc. Roy. Soc. (London)*, **108A**, 154-71(1925).—Two app. are described for viscosity measurements of (1) $10^{16.6}$ to 10^6 poises and (2) from 10^4 to 10^2 and less. In the former, the higher viscosities (10^{17} to 10^8) are calcd. from the angular velocity of a glass rod which twists under a known torque and the lower viscosities (10^9 to 10^6) from the angular velocity of a rod of "reactol" plunged in the glass. In the latter, the rate of fall through the glass of a partially counterpoised Pt-Ir ball suspended from a wire of the same material was used to det. the viscosity. A furnace which will give a temp. const. to 2° or 3° for an hour or two is described. Curves showing the temp.-viscosity relations for 13 (analyzed) glasses are given. (C. A.)

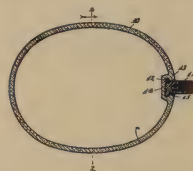
PATENTS

Method of drawing glass cylinders. THOMAS STENHOUSE.

U. S. 1,546,949, July 21, 1925. The method of drawing hollow glass articles, which consists in drawing a hollow article from a bath of molten glass, introducing a preheated fluid into the opposite ends of the hollow article, and increasing the volume of such fluid admitted to each end of the article in proportion to the progressively increasing length of the article.

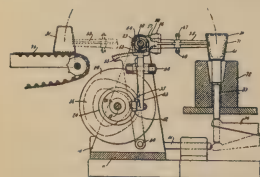
Glass float. JOHN A. LARSON. U. S.

1,547,052, July 21, 1925. As an article of manuf. a float comprising a hollow glass body and a nipple on the body adapted to connect with a float arm, said nipple having a non-circular flange at the inner end thereof embedded in the glass and held by the glass against displacement.



Taking-out device for glass-shaping machines. KARL E.

PEILER. U. S. 1,547,146, July 21, 1925. The combination with a glass-shaping mach. embodying a mold having a body portion and a movable bottom valve, of means for actuating said valve to elevate the ware from the body portion of the mold, a take-out device coöperating with said bottom valve, including a ware-receiving holder provided with a member overlapping an end portion of the ware adapted to retain the ware in said holder, and means for actuating said holder to transfer the ware from said valve to a receiving station.

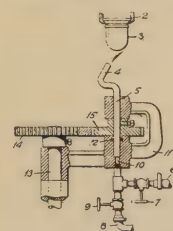
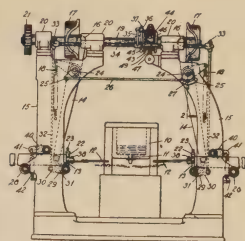


Apparatus for separating molten glass into mold charges.

KARL E. PEILER. U. S. 1,547,147, July 21, 1925. In app.

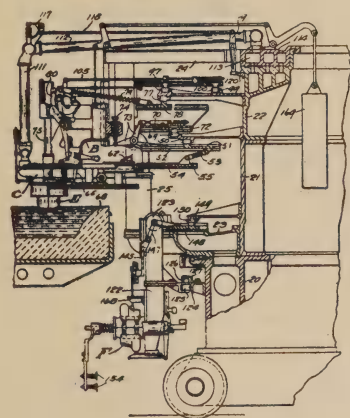
for separating molten glass into mold charges, the combination of shears to sever the glass, means for changing the plane of the shears during each severing operation, and means for adjusting the severing speed of the shears.

Method and apparatus for reheating glass parisons. KARL E. PEILER. U. S. 1,547,148, July 21, 1925. A glass-working burner comprising a flame-discharging nozzle, and means for revolving said nozzle.

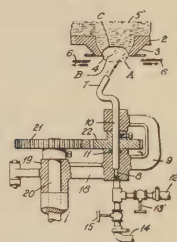


Feeding molten glass. KARL E. PEILER. U. S. 1,547,149, July 21, 1925. App. for feeding molten glass, comprising a container for the glass having a discharge outlet, and means for directing a revolving flame toward the said outlet.

Glass-forming machine. MICHAEL J. OWENS. U. S. 1,547,439, July 28, 1925. In a glass gathering mach.

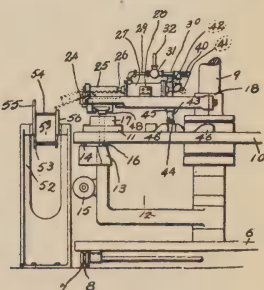
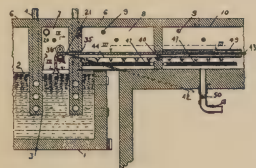


the combination of a mold carriage, means to rotate it continuously about a vertical axis, a sectional mold frame carried thereby, blank mold sections carried by said frame sections, means to move the frame sections rectilinearly toward and from each other in a direction radial to the mold carriage and thereby move the mold sections to and from each other, said sections being provided with a series of mold cavities at substantially equal distance from the center of the mach., neck molds adapted to register with the blank molds, means to charge the molds, said neck molds being operative to support the bare blanks when the blank molds are opened, finishing molds to enclose the blanks, and means to blow the blank in the finishing molds.



Lid take-off for glass-forming machines. HARRY B. LAWSON. U. S. 1,547,503, July 28, 1925. A lid take-off for glass-forming machs. comprising in combination with a glass-forming mach. having a rotary table provided with a plurality of molds, the means for lifting the finished article of said molds, of a plate pivotally mounted above the path of travel of said molds, a pocket formed on the underneath surface of said plate for receiving the finished article when raised out of the mold, and means for turning said plate with the finished article as lodged in the pocket and discharging the same on to a conveyor.

Drawing sheet glass. ROBERT G. EWING. U. S. 1,547,797, July 28, 1925. In continuous sheet glass drawing mechanism, a tank for molten glass supply, a bending member for glass from the tank, a leer, a perforate diaphragm in the leer, supporting means for the glass in the leer, on one side of which the formed glass may pass, and a burner on the opposite side of the diaphragm from the glass. In sheet glass drawing mechanism, a tank for molten glass supply,



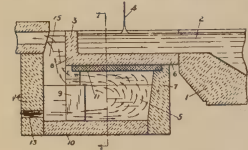
and a transversely extending member disposed above the tank in proximity thereto forming a convex bending guide for glass from the tank, there being fluid carbon compound supply means at the glass bending region of the member for lubricating the member.



Cased glass and articles made therefrom. JAMES REID BAKER. U. S. 1,547,715, July 28, 1925. Composite glass comprising a coating of a mat. resistant to the chemical action of alkali metals and vapors thereof.

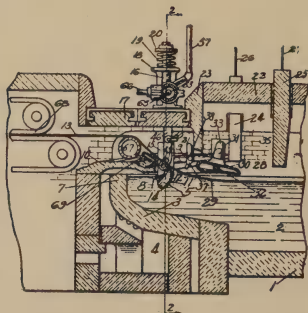
Method and apparatus for drawing sheet glass. ENOCH T. FERNGREN. U. S. 1,547,910, July 28, 1925.

The method of producing sheet glass consisting in congealing a layer or sheet of semi-solid glass on the surface of a pool of molten glass, floating this sheet of glass horizontally on the fluid glass there beneath, drawing the sheet over an elevated mass of fluid glass near one side of the pool, and cooling the surfaces of the sheet as they leave the pool.



Glass furnace. ENOCH T. FERNGREN. U. S. 1,547,911, July 28, 1925.

In a glass working mach., a container for molten glass comprising a lining of refrac. clay, and an outer supporting shell of silicon-carbide.



Method of interrupting longitudinal cracks in glass-sheet drawing. HARRY G. SLINGLUFF. U. S. 1,548,104, Aug. 4, 1925. The method of stopping a progressive longitudinal crack in a continuously drawn sheet of glass which consists in applying transversely of the sheet in advance of the crack a strip of fabric.

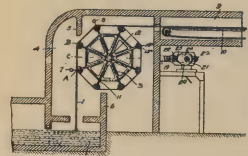
Process of severing glass. JOHN A. SWEET. U. S. 1,548,108, Aug. 4, 1925. A method of severing a glass article while said article

is maintained at a relatively high temp. to prevent cracking thereof, which consists in applying to the article

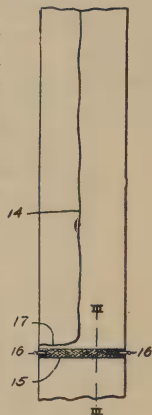
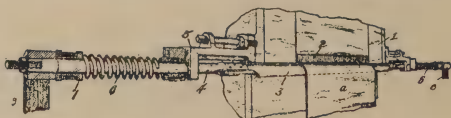
an electrically heated severing element maintained at a temp. such and applied for a period of time such that it melts its way through the glass.

Apparatus for drawing glass. CLARENCE M. BROWN. U. S.

1,548,114, Aug. 4, 1925. In combination in sheet glass drawing apparatus, a receptacle for a glass bath, a reel over the bath having a plurality of spaced drawing corners, which corners are arranged to act successively as drawing means for the glass, and means for so rotating the reel that each corner thereof during its period of draw moves at a substantially constant vertical speed.



Manufacture of glassware. ROBERT M. CORL. U. S. 1,548,444, Aug. 4, 1925. In an app. of the class described, a thin, flexible member of chromium alloy in formative contact with moving glass while the latter is in a formative condition, the member forming the resistance-heating element of an electric circuit and having a sharp tip portion projecting in



the direction of movement of the glass and from which the glass passes, and means for placing the member under longitudinal tension to maintain a true forming edge.

Manufacture of sheet glass. WILLIAM EMIL BOCK. U. S. 1,548,435, Aug. 4, 1925. In combination, a sheet section pressing means, means for feeding the lower end of a glass sheet into the pressing means, means for severing from the sheet a predetermined section disposed in the pressing means, and means before the pressing opern. for supporting the severed section in the pressing means and movable from section supporting position to allow the downward passage of the section after the pressing opern.

Sheet-glass-making apparatus. ROBERT M. CORLI. U. S. 1,548,445, Aug. 4, 1925. In app. of the

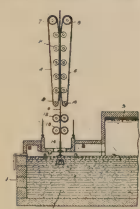
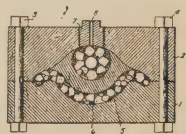
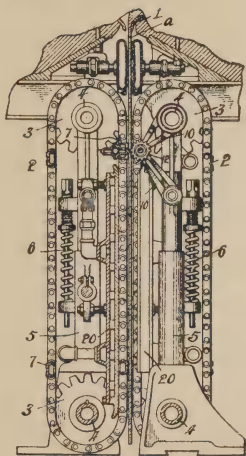
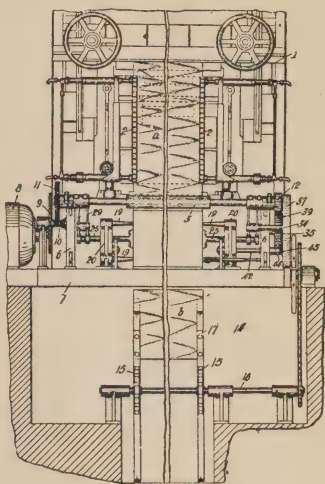
class described, clamping bars, means to move the bars in an endless path, one portion of the path being parallel with the path of a glass sheet being drawn and the bars leaving spaces across the sheet, said spaces being alternately short and long longitudinally of the sheet, and severing means mounted independently of the bars and adapted to act upon the sheet in said short spaces.

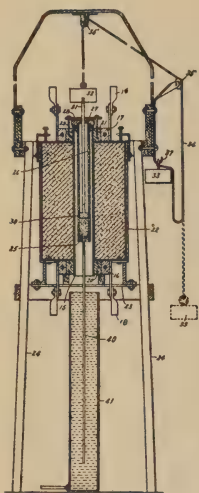
Bullet-proof glass. CONSTANTINE SHUMAN and ARTHUR G. WORRALL. U. S. 1,548,490, Aug. 4, 1925. As an article of manuf., a sheet of laminated glass comprising a relatively thick sheet of glass combined with a relatively thin sheet of glass secured to the surface of the relatively thick sheet of glass by a suitable binder filling the entire space between the surfaces of the glass sheets, and wherein the relatively thin sheet of glass is bent to conform to the general surface contour of the thick sheet and permanently held in such relation.

Quartz working. LEVI B. MILLER. U. S. 1,548,808, Aug. 4, 1925. The method of shaping quartz capable of conversion by heating to another modification of lower density which consists in confining said quartz in an enclosed mold in such quantity that when the quartz is heated to a temp. of plasticity the incidental increase of volume of said quartz will cause pressure to be exerted upon said mat., said mat. being so arranged that this pressure will cause the surface of the plastic mass to conform to the configuration of the mold.

Apparatus for making sheet glass. HARRY G. SLINGLUFF. U. S. 1,549,513, Aug. 11, 1925. In combination with app. arranged so as to draw a glass sheet from an open

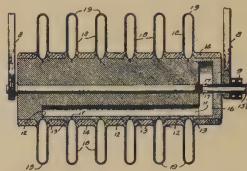
pool of molten glass, of means for preventing inward movement of the edge of the sheet in said open pool, comprising a shielding member spaced above the surface of the pool but closely adjacent thereto and provided with a slot on its inner side into which the edge of the sheet extends, such member being of sufficient area and mass to retard materially the radiation of the heat from the area of the pool beneath it from which the edge of the sheet is drawn, and sufficient to retard materially the cooling of the edge of the sheet above said member.



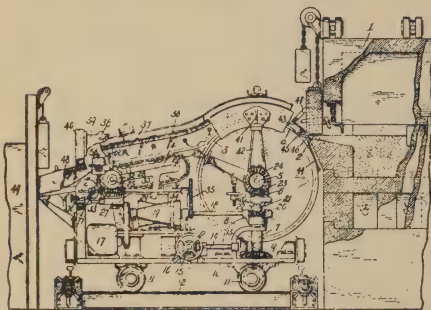


Silica glass. LEVI B. MILLER. U. S. 1,549,597, Aug. 11, 1925. The method of making shaped articles of transparent silica which consists in heating silica to a plastic state in a vacuum, the temp. being high enough to cause sealing over of cavities but below the temp. of active volatilization, removing the silica to a heating zone open to the atmosphere, and shaping the same under pressure while in a plastic state.

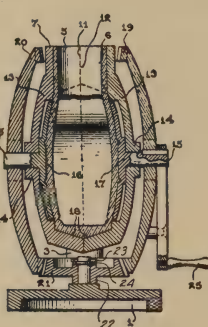
Method of and apparatus for forming glass sheets. WILLIAM E. HEAL. U. S. 1,549,541, Aug. 11, 1925. The method of forming glass sheets which comprises placing a layer of semi-fluid glass on the periphery of a gathering roll, revolving the roll to feed the glass outwardly by centrifugal force and form a pair of spaced sheets, and introducing air between the sheets during their formation to prevent collapsing.



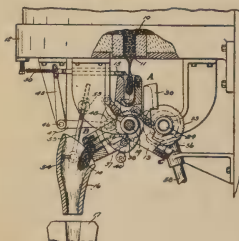
Molding flask. FRANK M. BIGELOW and ALBERT J. THROM. U. S. 1,550,492, Aug. 18, 1925. A molding flask for glassware blowing, comprising opposed complemental mold members having rotating bottoms having their inner faces provided with configurations for shaping the article to be molded.



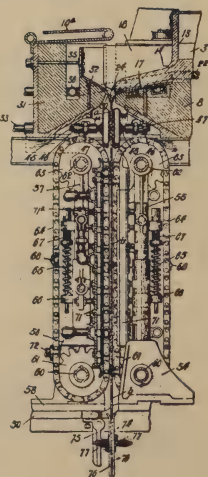
Manufacture of glassware. ROBERT M. CORL. U. S. 1,550,427, Aug. 18, 1925. In an app. of the glass described, a metallic heating element of high electric resistance having direct contact with a glass mass being acted on to effect a forming of glass at the point of contact.



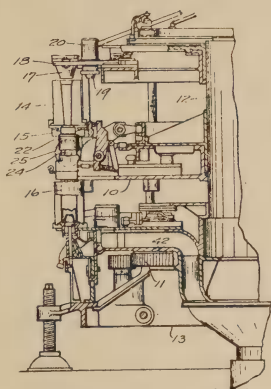
Manufacture of sheet glass. ROBERT M. CORL. U. S. 1,550,428, Aug. 18, 1925. The method of forming glass in sheet form, consisting in passing molten glass over or through a heated forming and finishing means downward from which the glass flows by gravity in sheet form, and supporting the central portion of the formed sheet from a point near the forming means to a point where the sheet is substantially set.



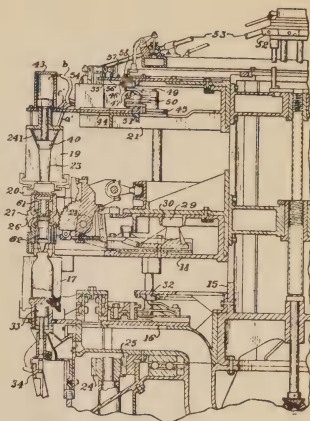
Mechanism for transferring molten glass. LEONARD D. SOUBIER. U. S. 1,550,397, Aug. 18, 1925. The combination of a partible gob-forming receptacle open at its upper end to receive molten glass, and means to invert and open the receptacle.



Glass-forming machine. ALBERT N. CRAMER. U. S. 1,550,346, Aug. 18, 1925. In a glass-forming mach. the combination of a split mold, a head adapted to enter one end of the mold, a stop plate and a piston motor, said head connected to the motor piston, the stop plate having a lost motion connection with the motor piston, said plate arranged to seat on the mold and arrest the mold-closing movement of said head.



Glass-forming machine. ALBERT N. CRAMER. U. S. 1,550,152, Aug. 18, 1925. In an automatic bottle blowing mach., a finishing mold comprising laterally swinging body sections, a vertically swinging bottom section comprising a central reëntrant bottom member movable vertically in said bottom section while the latter is in horizontal position, and means to move said bottom section vertically while held in horizontal position.

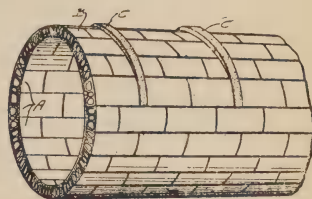


Filter. TOKIO ELECTRIC CO. Japan. 4,429, April 22, 1925. The filter is made of porous friable quartz glass consisting of small grains of quartz fused together at the points of contact. S. K.

Heavy Clay Products

PATENTS

Segmental tile structure. WILLIAM C. FERGUSON. U. S. 1,549,078, Aug. 11, 1925. A sewer, conduit or other tubular structure constructed of segment blocks or tile and provided with beams or saddles arranged in the upper portion of the structure in such a way that they assist in carrying the load imposed on said upper portion.



Roofing tile. ICHITARO KAWASE. Japan. 1,939, Oct. 22, 1924. A plastic body made of clay, bittern and water is formed into tiles which are afterward fired in a tile kiln. They are then heated up to about 200°C and are painted several times with a mixt. of shellac-alcohol and copper powder about 200°C hot. The tiles are strong, water-proof and durable. S. K.

Process of manufacturing light brick. KAN HORIE. Japan. 2,607, Dec. 12, 1924. A mixt. of clay, sawdust and Kokaseki (a kind of pumice) is kneaded with addition of an aqueous soln. of resin soap contg. sodium silicate. Brick made of the body is fired in a kiln. S. K.

Method of manufacturing brick. TSUNEJI NAGATA. Japan. 3,899, March 25, 1925.—A mixt. of refrac. clay, ferruginous clay and iron powder is kneaded with addition of water. The body is pressed, dried and fired at high temps. The brick is claimed to be strong and non-absorbent. S. K.

Refractories

Optical method of determining the fusion points of refractories. ENRIQUE HAUSER. *Rev. Mat. Constr. Trav. Pub.*, 190, 159-61B(1925).—By the use of a Féry optical pyrom-

eter H. detd. the fusion points of numerous refrac. mats. The pyrometer was sighted on the end of a molded stick of the mat., through an opening in a wall to minimize the extraneous light. The htg. was accomplished by means of an oxy-hydrogen flame. Seger cones heated at the base melted at temps. to within 10° to 20°C of their rating. The method is not adaptable for the m. p. detns. of oxidizable metals. L. N.

Properties of refractories with reference to metallurgical practice. W. GRUM-GRJIMAJLO. *Feuerfest*, 1 [1, 2], 3, 19(1925).—Discusses the corrosion of refrac. linings in metal fur. and methods of increasing resistance. (1) To prevent further shrinkage under operating conditions material must be burnt high enough to ensure stable vol. (2) Permanent expansion occurs only in poorly burnt silica brick where the change to tridymite involves a vol. growth up to 3.3%. In laying brick very thin joints should only be used in furnaces subjected to very high temp. where the temp. is above the softening point of the mortar. If the mortar is more refractory than the brick, use heavy joints which allow for expansion. Use of sawdust, charcoal and coke breeze recommended in place of quartz or grog as an addition to fire clay for mortar. This organic mat. burns away and leaves an elastic joint. (3) Refractory linings which soften under existing temp. conditions and melt together on the inner surface to form a solid wall offer good resistance as long as the temp. conditions remain constant. For conditions up to 700°C use common red brick with fire clay mortar. From 700 – 1200°C use clay-quartz fire brick. Up to 1450°C high grade refrac. clay brick are recommended and finally tridymite silica brick which will even stand up in arches at temp. of 1650°C . (4) Accuracy of shape and freedom from cracks depends mainly on careful prepn. of the body and handling before firing. (5) The action of metal slag is influenced not so much by the compn. of the brick as by the phys. structure and tridymite crystals unaffected by molten iron. (6) Heat condy. and resistance to temp. changes depend on the homogeneity of the mass and thorough firing rather than the use of coarse grained mats. Important steps in the manuf. of metal. refrac. are to burn grog to vitrification. Magnesite should reach 1600° in calcining. Use clay content of mixt. as low as possible and dry press method of molding. Addition to silica brick with 3% lime bond of 3% plastic red clay rich in iron recommended. Mach. pressing of silica brick not recommended, but addition of sawdust, etc., to increase porosity advisable. The firing must be carried on slow enough to ensure a uniform change in structure throughout the brick and high enough to make certain that all chem. and phys. changes have been fully completed. F. A. W.

Classifying refractory clays. E. WEBER. *Feuerfest*, 1 [1, 3], 5, 27(1925).—The old and newer methods of testing fire clay are discussed. Chemical analysis alone not sufficient but detn. of m. p., softening point under load and coeff. of expansion of importance. F. A. W.

The refractory nature of common high temperature oxides. J. BRONN. *Feuerfest*, 1 [3], 25(1925).—Nearly all high refrac. mat. used are in the form of oxides, *i. e.*, Al_2O_3 , CaO , MgO , SiO_2 , and Cr_2O_3 , FeO , Fe_2O_3 , TiO_2 , ZrO_2 . The need for closer investigation of the properties under high temp. of this latter group is brought out and now made possible by the development of the elec. fur. F. A. W.

Refractory materials for coking chambers and gas plants. L. LITINSKY. *Feuerfest*, 1 [4], 37(1925).—Entire range of refrac. mats. can be classified as follows: (1) Silica brick (high silica content) including such with lime or clay bond, Dinas, pudding-stone, ganister brick. (2) Chamotte brick (high alumina content) such as clay-grog, bauxite and corundum brick. (3) Silica-chamotte brick, having a clay base with the addition of free silica as well as grog. (4) Clay brick made of sandy clay and without grog. (5) Carbonaceous brick, made of graphite, carborundum, etc. (6) Unclassified containing special oxides, *i. e.*, magnesite, chrome, zircon, etc. Basic brick depend

for refractoriness on oxides and contain no free silica. Al_2O_3 content runs 35–40%. Acid brick depend for refractoriness on high SiO_2 content of 93–97%. Brick, the acid or basic qualities of which are not strongly pronounced, are considered as neutral. For the industrial conditions under consideration only bricks under 1, 2 and 3 are suitable.

F. A. W.

Automatic machinery and equipment for a firebrick plant. R. WEBER. *Feuerfest*, 1 [6], 57(1925).—Describes and illustrates with diagrams, a plant using as raw material very hard shale clay and grog. Preparation of shale (1) jaw crusher (2) ball mill (3) storage bins. Prepn. of grog (1) jaw crusher (2) screen (3) crushing rolls (4) horizontal rotary separating screen (5) storage bins. Material handled continuously by conveyors and bucket elevators. Mat. from bins is automatically proportioned and carried to a mixing and humid trough and from there to a pugmill furnished with automatic cut off. The blocks are then sent to the handmold or repress department.

F. A. W.

On the thermal changes of magnesite. YOSHIKAKI TADOKORO. The Research Lab. of the Iron Works, Yawata, Japan. *Report* 4 [2], 58 pp.(1924).—Thermal changes of two typical cryst. magnesites, produced in Daiseikkio, Manchuria, and widely used in Japan, are reported. Chem. compns. of specimens varied widely, two examples being as follows:

| | SiO_2 | Al_2O_3 | Fe_2O_3 | CaCO_3 | MgCO_3 | Accessory constituents. |
|-----------------|----------------|-------------------------|-------------------------|-----------------|-----------------|--|
| White magnesite | 16.62 | 0.32 | 0.72 | 0.90 | 81.42 | Talc and org. matter. |
| Blue magnesite | 20.02 | 0.14 | 0.14 | 0.60 | 79.03 | Serpentine, talc and considerable amt. of org. matter. |

Some specimens contd. only 1% of silica. I. Introduction. II. Change of compressive strength in hgt. The strength of the magnesites diminishes with progress of dissocn. and shows slight increase at 1300°C. III. Change in wt. observed by thermobalance (0–1400°C). Slight decreases in wt. occur at about 120° in white magnesite and about 200° in blue, probably owing to the expulsion of water. Dissocn. of MgCO_3 begins at about 400° and nearly ends at 850° in both specimens. The rate attains its max. at about 600°. Similar expt. on talc is described. Talc loses about 0.5% of its wt. at 80–350° and about 5.5% at 800–1150°. The max. rate of dissocn. is shown at 1000°C. Chapter IV. Change in coeff. of exp. (0–1600°C). White specimens expand gradually up to 650°C, then they begin to contract, probably owing to the thermal dissocn. They show a slight but sudden contraction at 950° where CaCO_3 in the specimens dissociates. They contract about 3.3% in length at 1300–1450° where crystn. of amorphous MgO occurs. Slight changes at 1450° may owe to the crystn. of amorphous CaO . Blue specimens show a slight but sudden expansion at 350–450°, probably caused by the combustion of org. matter. Abrupt changes occur at 650° and 950° as white magnesite. Sudden contractions take place at 1250° and 1450°. Cooling curves of both magnesites indicate no sign of transition points. Linear contractions of two white specimens were about 4.5% and 7.0% at 1600° which became after cooling to about 6.5% and 10.0% resp., while those of two blue specimens were about 0.5% and –0.2%, increasing to about 2.5% and 1.7% resp. after cooling. V. Detn. of transition points by thermal analysis (0–1300°C and 0–1600°C). (1) Thermal analysis at 0–1300°C by differential method. Blue magnesite and alundum powder were used as sample and neutral subs. resp. Endothermal change began at 513° and the difference rate attained its max. at 652°. The temp.-difference began to decrease at 687°, its rate becoming max. at 757°, and came to normal state at 800°. No change was observable at temps. where CaCO_3 in the sample must dissociate. Similar expt. on Iyo dolomite is described. Here the endothermal reactions occurred at 710° and 870°

the max. difference rate being shown at 810° and 950° respectively. (2) Thermal analysis at 0–1300°C by inverse time curve method. Inverse time curves, *i. e.*, curves showing the relation between temp. and time required for raising 10°C, are given for white and blue samples. In white magnesite, a slight endothermic change occurred at 300–430°C, probably owing to the decompn. of org. matter. A strong heat absorption due to disson. of MgCO_3 began at 520°, attaining its max. at 630°. A weak absorption was shown at 900–950°. It may owe to the disson. of CaCO_3 . In blue magnesite, decompn. of org. matter, MgCO_3 and CaCO_3 is indicated to take place at 300–430°, 600–810° and 850–970°, resp. (3) Thermal anal. at 1000–1600°C by inverse time-curve method. An elec. fur. of Mo wire and a Mo-W thermo-couple were used. An inverse time curve of blue magnesite shows two distinct heat absorptions at 1280–1320° and 1420–1480° which owe probably to crystn. of amorphous MgO and CaO resp. VI. Change in chem. compn. and sp. gr. (0–1700°C). Water adsorption of the white and blue magnesites, heated at various temps., rapidly increases at the htg. temp. of 500°, reaches its max. at 700° and becomes zero at 1300°C. Apparent sp. gr. and hardness of fired blue magnesite are as follows:

| | | | | | | | |
|--------------------------|-----|------|------|------|-------|-------|-------|
| Htg. temp. | 0° | 500° | 600° | 800° | 1000° | 1100° | 1700° |
| Sp. gr. | 3.0 | 2.9 | 2.7 | 1.5 | 1.5 | 1.6 | 2.8 |
| Mohr's scale of hardness | 3.5 | 5.5 | 3.5 | 3.0 | 2.5 | 4.5 | 5.5 |

VII. Change in micro-structure (0–1700°C). Thirty-six microphotographs with detailed descriptions are given. Refractive index of white magnesite increases regularly with htg. temp up to about 1280°C, then abrupt rise occurs. S. K.

Refractory bricks in coke-oven practice. G. E. JUNIUS. *Brennstoff-Chem.*, **6**, 139–43(1925); *Jour. Soc. Chem. Ind.*, **44B**, 485–6(1925).—Dalhausen fire clay contg. 90–93% SiO_2 was long used in Germany for coke ovens, but more recently, with the larger ovens now used, it has become necessary to use silica brick. Germany possesses two kinds of quartzite suitable for silica brick contg. 93–98% SiO_2 , the one having the quartz grains embedded in a matrix, and the other a feldspathic quartzite with quartz grains angular and interlocked. The former is more readily converted into tridymite and cristobalite than the latter on firing. The larger the quartz grains, the higher the temp., or the longer the time, necessary for conversion. American quartzites are instanced with grains $\frac{1}{3}$ mm. diam. German quartzites have lower softening pt. than American, due to the presence in them of orthoclase and muscovite, and a higher specific volume, 1.75–1.9, as compared to the Amer. 1.65. This is important in coking wet coals, as brick of high porosity is more readily damaged by water. The use of mortar made from broken silica brick or fused quartzite is recommended. H. H. S.

Microscopic relations of sulphide and silica in blast furnace and converter linings. T. C. PHEMISTER. *J. Geol.*, **33**, 275–85(1925). H. H. S.

The influence of phosphoric acid and phosphates on the rate of inversion of quartz in silica brick manufacture. W. HUGILL AND W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **23**, 304–61(1923).—It was found that there was no advantage in the addition of phosphoric acid either as pure P_2O_5 or as basic slag. H. F. S.

The preparation of pure zirconium salts from zirconium earth by means of phosphate. J. H. DE BOER. *Z. anorg. allgem. Chem.*, **144**, 190–6(1925).—The 2 impurities most difficult to remove are Ti and Fe. Since many earths can be found which contain only a trace or no Ti, de B. devotes his attention to Fe. Zr can be sepd. from Fe in large quantities by use of the double fluoride with K and NH_4 , the oxychloride, basic and acid sulphate, phosphate, and finally by a method based upon hydrolytic dissociation. Of these methods, that in which the phosphate is pptd. is the most satisfactory. The Zr

earth is fused with bisulphate; this is dissolved in H_2O and filtered, and the mixed hydroxides are pptd. with $NaOH$. They are washed by decantation and dissolved in concd. HCl , in considerable excess. Zr is then pptd. with H_3PO_4 , washed well with HCl to remove Fe completely, then with H_2O , and the phosphate is then dissolved in HF or KF , from which it is again pptd. with $NaOH$ in a pure condition. The hydroxide is used in the prepn. of other compds. The phosphate pptd. is very probably the orthophosphate, rather than the pyrophosphate as some workers have believed. In the presence of strong acid the tendency is toward the formation of ortho salt. Phosphate pptd. in acid soln. shows no tendency to hydrolyze, and is more easily sol. in HF than phosphate pptd. in neutral soln. Zr can be sepd. from HF by fractional crystn. of the soln. of the phosphates in HF , or by crystn. from soln. in NH_4 or K bifluorides.

(C. A.)

Refractories (for water-gas sets). W. M. RUSSELL. *Proc. Am. Gas Assoc.*, 1924, 822-9.—*Crowns* have been successfully cast in place on water-gas generators, with suitable wooden forms and a mixt. of 10% Johns-Manville No. 3200, 8% anhyd. Na silicate, and 82% fire clay; after 6 months' service such a crown in a 6.5-ft. generator had not even checked. A *carborundum lining* for an 11-ft. generator has been in use by the Binghampton Gas Works since Oct., 1922, with a net saving due to decreased clinker troubles. The use of blocks about 0.5 the size of the usual fire-brick shapes has prevented trouble due to expansion and cracking, no trouble having been encountered due to oxidation, probably because their fuel is a good grade of anthracite with very low Fe . A diagram shows the construction of the lining in detail. *Bernitz blocks* have been in test and use by the Gloucester Gas Light Co. since May, 1922. These consist of hollow, inter-connecting shapes, with perforated inner walls, part of the blast (and reversibly the steam) passing through the blocks and into the fuel bed through these perforations. The cooling and mechanical action of the blast prevents adherence of clinker to the walls. These blocks are ordinarily carried to a height of 36-40 in. above the grate bars. For most purposes Mutton Hollow silica is satisfactory as a material, but for badly clinkering fuels carborundum has been used for making the blocks; no trouble has been experienced with their cracking or oxidation. Diagrams show in detail the construction of the linings.

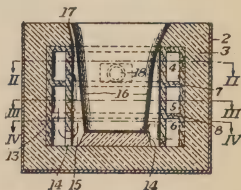
(C. A.)

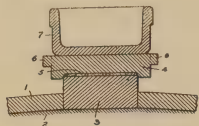
PATENTS

Composition for refractory wicks. CARL BUBERL. U. S. 1,546,616, July 21, 1925. A refrac. wick compn. of the class described including carbide of silicon and a binder.

Refractory article and method of making the same. CHARLES F. GEIGER. U. S. 1,546,833, July 21, 1925. A refrac. article containing silicon carbide, alumina and a binder produced by the reaction of said silicon carbide and alumina.

Crucible melting furnace. CLARENCE E. HAWKE. U. S. 1,547,872, July 28, 1925. A crucible melting fur., comprising a cylindrical outer metal shell having trunnions whereby the fur. is adapted to be mounted to tilt for the discharge of the metal melted within the crucible, a refrac. lining within said shell, a silicon carbide flue system within said lining, certain of the walls of which constitute the side walls of a chamber for receiving the crucible, and a crucible fixed within said chamber, said flue system comprising a plurality of superposed intercommunicating horizontal circular flues each extending substantially completely around said chamber, the upper flue having an admission port for burning gases and the lower flue communicating with said chamber at the lower end thereof, whereby the gases are compelled to travel a plurality of times about said chamber before being admitted thereto, substantially as described.





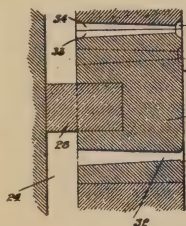
Pot seat. LEE SHOWERS. U. S. 1,548,103, Aug. 4, 1925.

In combination with the arched clay floor of a pot fur, having an opening therein, of a seating block of refrac. mat. set in fixed position in said opening in the floor, the said block having a flat continuous upper surface adapted to engage and support substantially the entire bottom area of the pot.

Method of and apparatus for molding silica brick.

WILLIAM ALLEN MILLER. U. S. 1,548,474, Aug. 4, 1925.

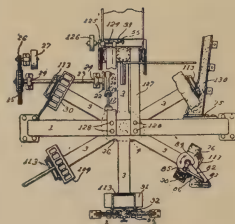
The herein described method of molding silica brick which consists in taking up the mixt., letting it fall, and following its descent with a blow from above thus hurling it into the mold and causing it to push into all the corners of the said mold.



Furnace. WARREN C. DRAKE.

U. S. 1,549,752, Aug. 18, 1925. A non-clinking fur. wall comprising inner and outer portions, the

inner wall built up of refrac. blocks constructed to afford air apertures directed into the fuel bed, such block presenting rear recesses adapted to receive separate spacing members, and separate spacing members engaged in such recesses of the inner wall so as to be supported thereby and to project rearwardly and contact the outer wall, to hold the walls spaced apart and maintain passages for conducting air to said apertures.



Process of manufacturing blocks for heat-insulation. THE TOKIO HOONZAI CO. Japan. 61,468, Oct. 22, 1924. Dry saw-dust is soaked with 2-5% soln. of a bicarbonate, preferably of sodium. A mixt. of 300 pts. of the wet saw-dust, 600 pts. of diatomaceous earth, 50 pts. of clay and 50 pts. of plaster of Paris are kneaded with 2-5% soln. of sodium silicate and syrup, in equal propn. Then the mass is formed into blocks which are fired at 800-1000°C.

S. K.

Process of manufacturing architectural refractories. RIUKICHI AONE. Japan. 3,576 (Supp. to Pat. 719), March 6, 1925. A mixt. of powdered Kokaseki (a kind of pumice), calcined magnesite and asbestos, with or without addition of slag cement, is kneaded with soln. of magnesium chloride or magnesium chloride and aluminium acetate. The plastic mass is formed into required shapes.

S. K.

Manufacture of refractory bricks, blocks or the like from dolomite or other materials or substances possessing plasticity at a high temperature. ANON. Brit. Pat. 223,616. *Quarry and Surv. and Contractors' Jour.*, 30, 205(1925).—The improved method consists in molding the dolomite under press. at a high temp. and the resultant molded articles or material, after emerging from the molds, are annealed. It has been found, up to the present, that a temp. of 1500°C is most suitable for granulated sintered dolomite alone, or dolomite mixed with any known fluxing agents, for example, ferric oxide, clay or basic slag. The annealing process is carried out by automatically conveying the resultant molded article or material in an annealing or cooling chamber or tunnel, the cooling being a very gradual one.

O. P. R. O.

Terra Cotta

PATENTS

Method of firing architectural tiles. HACHIJIRO MATSUMURA. Japan. 61,482, Oct. 22, 1924. A number of triangular pins are inserted into the holes in two opposite sides of a deep rectangular sagger, the holes being arranged stepwise. A glazed tile with four projections is set horizontally with the face down on each four pins. Then

a glazed tile having no projection is set with the face up on it. The projections are cut off after firing. S. K.

Process of manufacturing imitation granite. TOKIZO SANO and TERUKICHI SHIMIZU. Japan. 3,218, Feb. 16, 1925. A body, composed of ground granite, feldspar kaolin, soda-ash and water, is kneaded and pressed into tiles. On drying, white powder of soda-ash will appear on the surface of the tile. Then calcined sand is applied on its back and fired. Soda-ash serves in vitrifying the surface of tile and also in binding the applied sand. S. K.

White Ware

On puncture voltage of porcelain. TETSUJIRO TODA. The Tokio Industrial Lab. *Rept.* 19, No. 1, 39 pp. (1924).—Puncture voltage of porcelain, composed of 30–70% clay, 10–50% feldspar and 50–80% quartz and fired at SK 9, 12 or 15 for 18, 22 or 26 hrs. resp., was studied. Source of clay was (a) Gairome (highly plastic kaolin), (b) Kibushi (ball clay), (c) Shirae (kaolin) + Gairome, (d) Shirae + Kibushi or (e) Korean kaolin (very pure kaolin) + Gairome. In testing, the porcelain disk, 14 cm. large and 5 mm. thick, was placed between a needle electrode and a steel disk in oil. Compns. which gave the best result in each group are as follows:

| Group | Gairome | Kibushi | Shirae | Korean kaolin | Feldspar | Quartz | Firing temp. | Puncture voltage |
|-------|---------|---------|--------|---------------|----------|--------|--------------|------------------|
| a | 50 | .. | .. | .. | 40 | 10 | SK 12 | 65,000 |
| b | .. | 60 | .. | .. | 10 | 30 | SK 12 | 67,500 |
| c | 25 | .. | 35 | .. | 10 | 30 | SK 15 | 74,500 |
| d | .. | 25 | 45 | .. | 10 | 20 | SK 15 | 76,800 |
| e | 25 | .. | .. | 45 | 30 | .. | SK 12 | 78,750 |

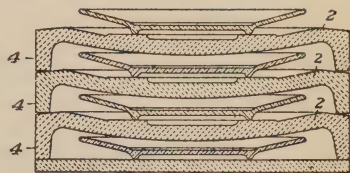
Conclusions: (1) The best results are obtained with bodies rich in lean kaolins and poor in plastic clays. (2) Shirae bodies are best fired at SK 15 instead of SK 12 in the other bodies. (3) Increase of clay in the body tends to raise the puncture voltage. (4) The highest voltage in a body is given at its min. apparent sp. gr. Expts. with bodies contg. magnesite, limestone or various frits, $\text{RO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$, as flux failed to show any particular results. S. K.

White glazed sanitary fireclay goods. W. THOMPSON. *The Industrial Chemist*, 1, 91 (1925).—White glazed sanitary fire clay ware may be considered as being a refinement of the stoneware manuf. T. gives a popular description of mfg. process.

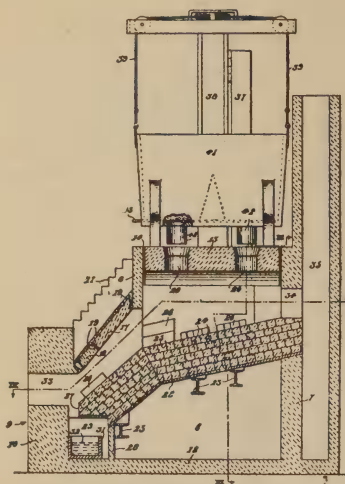
O. P. R. O.

PATENTS

Support for ceramic ware. FRANCIS W. HIGGINS. U. S. 1,546,382, July 21, 1925. A support for firing ceramic ware, consisting of a load-supporting plate or member combined with supporting legs or spacers, both the plate and legs being formed of a mat. having a higher modulus of rupture at 1350°C than 300 pounds per sq. in.



Method of manufacturing hard faience. NIPPON HARD FAIENCE CO. Japan. 60,699, May 31, 1924. Twenty to 23 pts. of zinc oxide or a zinc ore are added to 80–97 pts. of body materials for ordinary hard faience, to which a suitable amt. of a cobalt compd. has been introduced. The new body is fired, e. g., at cone 1a. Advantages of introducing zinc compd. are: (1) it improves color of the ware; (2) it lowers the biscuiting temp.; (3) it prevents the ware from crazing. S. K.



Frit kiln. FRANK P. VOGEL. U. S. 1,550,474, Aug. 18, 1925. In a device of the type described, a kiln, an inclined bridge arranged in said kiln to form a heating chamber thereabove, a heat entrance leading into the chamber at the lower end of the bridge, a heat exit leading from the chamber at the higher end of the bridge, said chamber having an entrance for the mat. to be fritted formed in the top wall of the kiln above the upper portion of the bridge, the bridge having its lower end terminating in spaced relation with the adjacent wall of the kiln to form a molten frit discharge, a plurality of downwardly converging pairs of stays projecting above said bridge and forming a molten frit flow path extending longitudinally of the bridge, and a liquid carrying pan below said discharge to receive the molten frit.

New method of manufacturing pottery. TOKIJI UCHIDA. Japan. 60,647, May 15, 1924.

Wares are made of a plastic body composed of ground magnesite, clay, pigment and water. For example, a mixt. of 50 pts. magnesite, 45 pts. Kibushi clay and 5 pts. rouge is used. After drying, the wares are fired for 3-5 hrs. at about 800°C and then dipped in a soln. of magnesium chloride (about 25°Bé) for several hrs. S. K.

Method of manufacturing talc potteries. KOSUKE HIRANO and SHINOBU KOMORI. Japan. 62,292 (Supp. to Pat. 40,863), Feb. 6, 1925. Talc, calcined magnesite and magnesium chloride are used as body materials. E. g., talc 25, talc calcined at about 1250°C 30, kaolin or clay 30, feldspar 10, magnesite calcined at 800°C 3-5 and magnesium chloride 2-5 compose a body; 5-10 pts. of Sorel cement may be used in place of the last two materials. Wares formed of the body are glazed after drying and glost-fired. S. K.

Speedy weighing means more profits in industry. EARL STEARNS. *Nat. Glass Budget*, 41 [14], 3(1925).—Description of the Messiter Conveyor Scale which weighs and records the tonnage while in transit. F. G. J.

Equipment and Apparatus

Platinum resistance thermometry at low temperatures. M. S. VAN DUSEN. *Sci. Abst.*, 28 [6], 469(1925); *Jour. Am. Chem. Soc.*, 47, 326-32(1925).—Below the region -40°C temps. defined by the Callendar equation depart from the thermodynamic scale by amounts which increase very rapidly below -100°C, the calcd. temps. being 2° too low at liquid-air temps. A simple modification of the Callendar equation for platinum resistance thermometry above 0°C is given, which will express accurately the resistance of platinum on the thermodynamic scale from 0°C to -190°C. The revised equation contains an additional term,

$$t = \frac{1}{\alpha} \left[\frac{R}{R_0} - 1 \right] + \delta \left[\frac{t}{100} - 1 \right] \frac{t}{100} + \beta \left[\frac{t}{100} - 1 \right] \frac{t^3}{100^3}$$

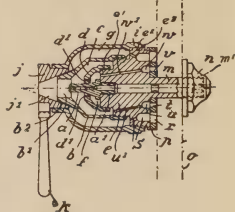
The last term is omitted for temps. above zero. β is detd. by calibration at or near the b. p. of oxygen, and α and δ as in ordinary work. The new equation requires but one calibration below zero. Recalculations of data on resistance thermometers at low temps. obtained at the Reichsanstalt and the Bur. of Standards are made and tabulated showing

that the modified equation expresses the experimental results within the errors of observation.

A. F. G.

PATENT

Method for spraying fusible material in continuous lengths. NICOLAUS MEURER. U. S. 1,549,843, Aug. 18, 1925. A method of spraying fusible mat., consisting in feeding the mat. forward in continuous lengths to a flame produced by the ignition of a combustible gas mixture, fusing the mat. in the said flame and finally atomizing the fused mat. by directing a jet of compressed gas into it at a point forward of the point of fusion.



Kilns, Furnaces, Fuels and Combustion

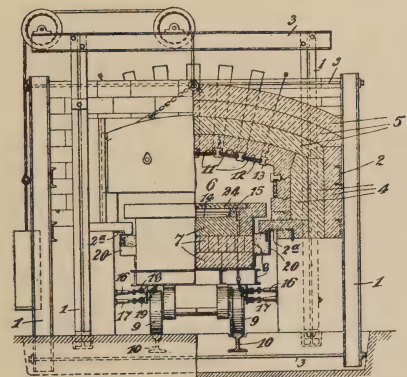
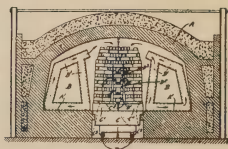
Advantages of the new method of constructing the Hoffmann continuous brick kiln. H. DE WIT. *Rev. Mat. Constr. Trav. Pub.*, 189, 125-30B(1925).—Hoffmann kilns are still being constructed today in the same massive style originated 75 years ago. The usual arguments are refuted, namely (1) that the massive construction conserves the fuel. De Wit maintains that no more coal is burned in a kiln with walls 45 cm. thick than in one 3 m. thick, and that this point has been proved by actual comparisons in practice. (2) That a heavily built kiln insures a stable structure. The results of expansion and contraction due to heating and cooling are more noticeable on thick walls because there is more mat. to expand, and the walls usually do not contract to the original dimensions but leave interstices which widen with htgs. Another disadvantage is that the large cracks often establish air currents in the kiln, and these usually operate in an undesirable manner. The further criticisms of the old manner of construction are that the price of building is exorbitant and that the old kilns are bulky. An old kiln requires 700 sq. m. of ground as compared to 340 sq. m. for a new type having the same kiln capacity. The total masonry for the old kiln amounts to 2300 cu. m. whereas the new requires but 400 cu. m. with 25 tons of metal supports and parts. A number of sketches are given to help visualize the differences in construction between the two types.

L. N.

PATENTS

Electric furnace. EDWIN L. SMALLEY. U. S. 1,547,623, July 28, 1925. An elec. fur. comprising a top portion, a base portion constituting a movable support for conveying the mat. to be heated, a heating element carried by said base portion, and means for energizing said heating element, substantially as specified.

Method of burning brick and analogous ware in tunnel kilns and car for burning the ware. PAUL A. MEEHAN. U. S. 1,549,143, Aug. 11, 1925. The improved method of heating ware in a continuous tunnel



kiln which consists in supplying the main portion of the heat requirements of the kiln in the usual manner and separately supplying heat to secure a local heating effect obtained by burning fuel in proximity to the lower portion of the ware in the kiln along the central longitudinal plane through the kiln.

Roofing-tile kiln. MINOSAKU SUGIYAMA. Japan. 2,606, Dec. 12, 1924. In a rectangular kiln with fire-boxes at both ends, a latticed wall is built between kiln room and each fire-box. The kiln has two straight bag-walls with holes inside the latticed walls. Most of the flame will enter the kiln room upward through flues built under the kiln floor. Products of combustion escape the room through an opening at upper part of each side wall. S. K.

Roofing-tile kiln. SHUNTARO FUJIWARA. Japan. 2,250, Nov. 19, 1924. In a rectangular kiln with fire-boxes at front side, the flame enters the kiln room through three sets of holes in its front wall: (1) Several big holes beneath the kiln floor which make the flame enter the kiln room upwards; (2) Many small oblique holes built half way up the wall; (3) Several holes of medium size at upper part of the wall. The products of combustion escape the kiln room through holes at upper part of the rear wall and pass through a narrow room behind the wall downwards. S. K.

Tunnel kiln. TOYO TOKI Co. Japan. 3,570, March 4, 1925. A tunnel kiln, which has two combustion chambers with corrugated walls in its sides and fires the wares by means of hot circulating air, is connected with a drying arrangement in order to lead the dried air into the kiln at a point close to its mouth end. S. K.

Geology

Marketing lump and ground silica. FELIX EDGAR WORMSER. *Eng. Min. Jour.-Press*, 119 [10], 402-4(1925).—This article treats of vein quartz, quartzose rocks crushed to lump or powdered form and flint. Silica is hard, tough, resistant to acids, refractory and often transparent. Its chem. affinity for alkalis and other compds. is used in glass manuf. and the fluxing of ores. In massive form, silica is quarried and used as a packing in acid towers, made into grindstones or shipped to smelters to be used as a flux. Lump silica may be used in the manuf. of ferro silicon in the elec. fur. Ganister, silica rock, is used in the manuf. of silica brick which is widely used in metallurgical work. Flint, a cryptocrystalline variety of quartz of vitreous luster, is used in the form of pebbles as a grinding medium in pebble mills. Natural silica sand is used mainly in glass manuf. Sand for glass manuf. should be as pure as possible; iron oxide is especially undesirable. The limits allowable in common practice, as given by Cole, are:

| | Per cent Fe_2O_3 |
|--------------------------------------|----------------------------------|
| Flint glass and soda-lime glass..... | 0.02 to 0.05 |
| Plate glass..... | .10 to .20 |
| Bottles and window glass..... | .20 to .35 |
| Dark bottles..... | .50 to .65 |

If the iron oxide content is not over 20%, the green color imparted can be neutralized by a decolorizer as Mn, Co, Se and Ni. Glass sands average over 99% silica. The character of the silica grains is an important factor. Uniformity in grain size is desirable for greater ease in melting. Exceptionably pure silica sand is used in the manuf. of carborundum. Crushed silica may be used for lining furnaces, converters and other smelting apparatus. Water-clear quartz crystals are now used to manuf. clear fused quartz. Commercial production has not yet begun, but the field for the use of clear fused quartz seems to be a large one. Powdered silica has a moderate industrial application. It is used mainly in the manuf. of paints, pottery, soaps, polishes, wood fillers, tooth powders, phonograph records, rubber goods and in dusting foundry molds and roofing papers. The prices of all silica products sold in raw form fluctuate slowly. Owing to abundance of the mineral and ease of production, prices are usually low. As in most non-metallic mineral production, uniformity of product is highly desirable.

A. H. K.

Recovering zircon from a zirconiferous pegmatite. R. C. GOSREAU. *Eng. Min. Jour.-Press*, 119 [10], 405-6(1925).—Zircon, ZrSiO_4 , occurs in north central Wisconsin as pegmatite veins with igneous rocks of diorite with syenite. The dikes have a width at the outcrop of about 1300 feet and the strike can be followed for about 2000 feet. On the surface the pegmatite is much weathered. The zircon is high in alumina, 4% to 8%, while the oxide averages about 60.3%. The raw rock was crushed through a jaw-crusher to $\frac{1}{4}$ inch and careful sampling showed 15.9% of ZrO_2 and 26.4% of ZrSiO_4 . The $\frac{1}{4}$ -inch rock was ground to a minus 35- and plus 65-mesh product to release the zircon from the quartz-feldspar matrix. The product was concentrated on Wilfley tables, a pure concentrate rather than a high recovery being sought. The final product had an analysis of:

| | | | |
|-------------------------------|-------|-------------------------------------|------|
| ZrO_2 | 57.34 | Al_2O_3 (free)..... | 0.65 |
| ZrSiO_4 | 95.00 | SiO_2 (free)..... | 4.80 |
| Fe_2O_3 | 0.30 | | |

This product, when dried and ground to 120-mesh, had a dull white color. The final product and concentration products from this treatment were studied, tested and found suitable for: (1) Brick for iron, steel and glass fur. linings. (2) Crucibles, muffles, combustion tubes and insulating tubes. (3) Surface cement for covering other refrac. mats. (4) Enamel pigment for iron and steel enamels. (5) Add to enamelware, silica- and stoneware to increase elasticity and strength. (6) To prevent devitrification in enameling. (7) Monolithic lining and patch material for elec. fur. (8) High quality refrac. obtained by fusing in elec. arc and regrinding. (9) A base for making pure zirconium oxide. (10) An ingredient in magnesia and alumina refractories. A. H. K.

Andalusite in California. JOHN MELHASE. *Eng. Min. Jour.-Press*, 120 [3], 91-4 (1925).—This article is based on observations incident to a trip to the Champion Porcelain Co.'s andalusite mine in the White Mountains of Calif. The andalusite is contained in a dike at an elevation of 8600 feet on the side of a canyon wall. Distribution of the ore appears to be fairly uniform with reference to length and depth along the dike but varies across the dike. Several thousand tons of ore have already been removed. After mining the ore it is broken to size, sorted by hand, put into bags holding approximately 100 lbs. and transported by pack train down a narrow mountain trail to a wagon road where it is dumped into a loading bin from which it is hauled by truck to the railroad. Andalusite forms from 75% to 80% of the mass of the ore mined. Shipments of ore, up to the Fall of 1924, had not exceeded 70 T. per week. Total probable cost of laying the ore down in Detroit at the Champion Porcelain Co. is about \$43 per ton. The cyanite deposits of California have recently received considerable attention due to their easy accessibility and the large size of the ore bodies. At present they are owned by the Vitrefrax Co. Quartz is the chief gangue mineral in cyanite and has proved troublesome in concentrating. Recently a process has been devised, it is understood, that promises to solve the difficulty. A. H. K.

Antimony in China. ANON. *Chem. Eng. Min. Rev.*, 17, 363(1925).—The decrease in antimony production in 1924 was due to heavy floods in Hunan province. Military movements and bandits also hampered transportation. M. E. M.

Production and properties of titanium oxide. R. H. MONK AND C. WHITEMORE. *Can. Chem. and Met.*, 9 [7], 153(1925).—Describes the methods used at the large deposit at Ivry, Quebec, between Quebec City and Montreal for processing, removing the iron and calcining. Most of the output goes into white paint. It is also used as an opacifier in enameled ware. It is said to improve the qualities of fused silica. It has been used in making artificial teeth to give a slightly yellow color. F. G. J.

Bauxite. ANON. *Queensland Gov. Min. Jour.*, **26**, 219(1925).—The Commonwealth possesses vast deposits of bauxite, unexploited. The official announcement in France that a process for the economical manuf. of aluminous cement has been discovered in the Dept. of Herault, may hasten the development of Australia's bauxite deposits. O. P. R. O.

Bauxite, its industrial importance and its new applications. ALBERT HUTIN. *La nature*, **53** [1], 204-6(1925).—Descriptive. (C. A.)

Chemistry and Physics

Temperature limits employed in technical and scientific work. RUFF. *Quim. e Ind.*, **2**, 116(1925).—The fusion points of compounds, elements, oxides or combination of oxides, and carbides are given. The b. p. of the elements are given. The temps. are all above 1500°C except with the elements. Sixty-six different mats. were reported in the article. S. S. C.

Methods of measuring high temperatures. R. ESCAT-SERRA. *Quim. e Ind.*, **2**, 87(1925).—The apps. for measg. low temps. below 700°C are described and the theory of operation. The total radiation, optical and thermocouple pyrometers are described in detail and drawings of the instruments are shown. The article is only a review of various means of temp. measg. and does not bring forth any new methods. S. S. C.

The behavior of clays, bauxites, etc. on heating. III. H. S. HOULDSWORTH AND J. W. COBB. *Trans. Ceram. Soc. (Eng.)*, **23**, 279-92(1923-24).—The shrinkage of clays on hgt. takes place in a number of stages. Shrinkages of considerable magnitude occur at almost the same temp. in different clays, viz., 530°C (except with ball clay), 880°, 950° and 1030-1060°. Changes in d., refractive indices and soly. in acids occur at these temps. Kaolin and fire clay lose water appreciably at 420-450°; diasporite at 370-400°; gibbsite at 160-190°; red bauxite at 350-410°. Gray bauxite loses water at 200-220° and 390-450°; allophane at 15-90°, 120-180°, 230-280° and 670-820°. Kaolin and fire clays show a distinct heat absorption at 500-530° and a heat evolution at 950°. Pure alumina gives heat evolution at 1060, and red bauxite at 1000. Heat phenomena accompany loss of wt. in many of the other subs. The change responsible for the exothermic effect in clay at 950, and that occurring with alumina at 1060 could be completed at 900 by continued hgt. None of the heat phenomena observed in clays could be attributed to interaction between the clays and impurities. No evolution of heat at 950 was detected when alumina and silica of the compn. $\text{Al}_2\text{O}_3 + 2\text{SiO}_2$ were heated or when mixts. of the compn. $\text{Al}_2\text{O}_3\text{SiO}_2 + \text{SiO}_2$ were heated. H. F. S.

Synthesis and industrial manufacture of sillimanite. O. REBUFFAT. *Trans. Ceram. Soc. (Eng.)*, **23**, 312-3(1923-24).—Sillimanite can be made by mixing hydrated alumina with kaolinite and gradually hgt. the mixt. to 1400°C. H. F. S.

Results of X-ray investigation of the crystalline nature of china, clays, etc. G. SHEARER. *Trans. Ceram. Soc. (Eng.)*, **23**, 314-7(1923-24).—Examination of china clay heated at 1200, china clay heated at 1700 and natural sillimanite gives almost identical lines in X-Ray photographs, indicating that the cryst. mat. in these heated china clays was sillimanite. China clay (1 mol.) and alumina (1 mol.) heated at 1200° and 1700°C and also china clay (1 mol.) and alumina (2 mols.) heated at 1200°C gave very similar spectra, indicating that in these sillimanite and alumina were the cryst. ingredients. However, china clay (1 mol.) and alumina (2 mols.) heated at 1700°C gave an entirely different spectra showing the presence of a new compd. of different characteristics from either sillimanite or alumina. Further work will be done on this compd. by S. H. F. S.

The action of heat on kaolinite and other clays. I. J. W. MELLOR AND A. SCOTT. *Trans. Ceram. Soc. (Eng.)*, **23**, 322-9 (1923-24).—The dehydration of kaolinite does not

take place at a fixed temp. and is completed above 500°C. Kaolinite when heated to just above 500°C decomposed into free silica, free alumina and water. The critical point in the neighborhood of 900° is connected with a transformation in the form of the alumina. Sillimanite, the same compn. or the natural mineral can develop at temps. below 1200°C and probably above that temp. forms solid solns. with $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$. A new compd. is formed when kaolinite is heated to 1700°. This may be $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$, called mullite by Bowen and Greig (*Jour. Wash. Acad. Sci.*, **14**, 183). H. F. S.

The dehydration of kaolinite. J. V. SAMOILOFF. *Trans. Ceram. Soc. (Eng.)*, **23**, 338-9(1923-24).—From a study of the htg. curves of kaolinite and other alumina silicates, S. concludes that in the process of dehydration kaolinite is decomposed into Al_2SiO_5 and SiO_2 . H. F. S.

The thermal and electrical conductivities of some pure metals. F. H. SCHOFIELD. *Sci. Abst.*, **28** [6], 468(1925); *Roy. Soc. Proc.*, **107**, 206-27(1925).—Earlier research on thermal condy. has been over temps. from 100°C down to below -250°C, and the object of the present investigation was to extend to 700°C the measurements of thermal and elec. condy. of a number of metals of the highest purity obtainable commercially. The guard ring method was employed, steady conditions being obtained in the specimen and lateral heat losses reduced to low values. The specimen, in the form of a cylindrical rod, was heated by a Pt coil wound on a silica rod placed in a cavity at its center, and Cu rods screwed into its ends served as sinks. Various devices were employed to increase or decrease the heat losses from these ends. Temperatures along the rod were obtained with thermocouples of Pt and 10% Ir-Pt. An accuracy of 1-2% was obtained. Electrical condys. were measured by a comparison of the voltage drop along the specimen and a standard resist. in series with it. The results obtained for both conductivities and for Lorenz's function are compared with those of Jäger and Diesselhorst, Lees, Angell, Konno, and Honda and Shimidu. It was found that the thermal conductivity of Al increased with rising temp. Ni decreases at first, but above 500°C rises, while Cu, Mg and Zn show a slight decrease with rising temps. For Lorenz's function, Cu, Mg and Zn are practically constant at all temps. Al rises with increasing temp., while Ni increases up to 300°C, and is nearly constant above, with an abnormal value at 400°C. A. F. G.

Some new methods for the measurement of thermal conductivity. T. BARRATT AND R. M. WINTER. *Sci. Abst.*, **28** [6], 468(1925); *Phil. Mag.*, **49**, 313-22(1925).—In an earlier paper one of the authors has shown [see *Abstract*, 1991(1914)] that the thermal condy. of a thin rod can be expressed as $k = (H^2/pqhV^2)\coth^2 al$, or when the rod is long $k = H^2/pqhV^2$, wherein H = the heat supplied in calories per second to the hot end of the rod, at which the temp. difference between the rod and its surroundings is V degrees C; p = perimeter of rod in cm.; q = area of cross-section in sq. cm.; l = length of rod in cm.; $a = \sqrt{hp/qk}$; and h is the emissivity of the surface. The uncertain and troublesome part of the measurements required to determine k is that involved in finding h , since this factor depends on a number of important conditions difficult to take completely into account. The present paper describes new methods, based on those of the earlier paper, in which h is entirely eliminated from the formulas, thus removing the necessity for measg. it. The general equation for the fall of temp. along a rod is first solved in a general way, the soln. being transformed so as to give k in terms of H , q , a , V , and the temp. excess at any other point along the rod. The resulting expression is not explicit, but can easily be solved graphically, a numerical example illustrating the procedure in a typical case. From the general expression a simple formula for k is found requiring merely the measurement of H , the temp. at the hot end of the rod, the cross-section, and the temp. at any other point along the rod. Formulas are also found in the cases when (a) h/ka is small; (b) q , l , H , V and V' , the temperature excess at the cold

end, are specified together with condition (a); (c) the ratio H/V is known for two values of l . Finally, a formula for h is found under the conditions specified in (b). A. F. G.

Action of electrolytes on clays. SEIJI KONDO. *Jour. Soc. Chem. Ind. (Japan)*, **322**, 1315-46(1924).—I. Action of certain dyes on clays. (1) Introd. (2) Preliminary expts. on the adsorption of malachite green by various clays. Chemically pure HCl-salt of the tetramethyl di-*p*-amidotriphenyl carbinol was used. The amts. of the dye, adsorbed by 1 g. of 25 typical high-grade clays, are compared with their phys. properties which are closely connected with plasticity. Plasticity of 9 clays as measured by the adsorption of the dye did not agree with fact. (3) Estn. of malachite green. K. succeeded in estg. the dye by titrating with KMnO_4 or better with picric acid, whose results are far more accurate than those of the usual colorimetric method. (4) The equil. of adsorp. of the dye by various clays. The results of expts. with 5 high-grade clays show that the Freundlich formula does not hold for the adsorp. of the dye by clays. (5) The elec. condy. of the dye solns. The elec. condy. of the dye solns. obtained in the preceding expts. and that of the pure dye solns. of various concns. were measured. The results show that the condy. of the pure malachite green soln. is not materially affected by treating with a clay. K. explains the phenomenon as follows: $\text{C}_{23}\text{H}_{26}\text{N}_2\text{Cl} = \text{C}_{23}\text{H}_{26}\text{N}_2^+ + \text{Cl}^-$; $\text{M} + \text{C}_{23}\text{H}_{26}\text{N}_2^+ = \text{M}^+ + \text{C}_{23}\text{H}_{26}\text{N}_2$; where M^+ is an equiv. of cation which has been combined with the clay; thus equiv. amt. of cation is set free from the clay and accordingly no remarkable change in condy. occurs. (6) The Cl content of the dye soln. The Cl content of the dye soln. is only slightly affected by the adsorp. (7) The effect of the proportion of water on the adsorp., those of the dye and clay remaining constant. The effect of the concn. of the dye soln. on the adsorp. is slight, provided that the ratio of the dye to the clay remains constant. K. assumes that the adsorp. is a chem. reaction. For the sake of convenience, suppose that the clay has only potassium kaolinate whose mol. formula is assumed as KA; then the reaction may be expressed by $\text{KA} + \text{C}_{23}\text{H}_{26}\text{N}_2\text{Cl} = \text{KCl} + \text{C}_{23}\text{H}_{26}\text{N}_2\text{A}$; if the mol. concns. of these subs. are m_1, m_2, m_3 and m_4 with degrees of ionization d_1, d_2, d_3 and d_4 at equil., we have the relation $m_1d_1 - m_2d_2 = m_3d_3 - m_4d_4$; since kaolinites are assumed only sparingly sol. in water, m_1, m_4, d_1 and d_4 may be assumed as constant; thus the equation becomes $m_2d_2 = m_3d_3$, which clearly explains the fact. (8) The surface tension of the dye solns. The surface tension of the dye solns. is affected by the adsorp. But no useful conclusion is deduced. (9) Adsorp. of the dye by clays, fired at various temps. Adsorp. of the dye by English china clay and Korean kaolin which had been fired at 110–1410°C was studied. Results: (a) Korean kaolin fired at 1300° has a strong adsorptive power which corresponds to 46.1% of that of the kaolin dried at 110°; (b) the color of the resulting sample fades rapidly as the firing temp. rises, and those fired at 1200° are only slightly green; (c) remarkable changes in adsorp. occur at 500° and 1200°, and a less marked one at 800–1000°, where thermal changes were assured to take place by Mellor and others; (d) fired kaolins rehydrate in moist atmosphere; (e) the fired kaolins do not adsorb Cl from the dye solns. (10) Adsorp. of methyl violet by clays. The results of the expts. with methyl violet 2B and the clays show that it can be used for measuring their plasticity; but, the fact that the dye-clay suspension clarifies very slowly is a serious defect of the dye. II. Action of inorg. electrolytes on clays. (1) Introd. (2) General description on the expts. 3–12. Adsorp. of KOH , Ba(OH)_2 , K_2CO_3 , KCl , BaCl_2 , Fe_2Cl_6 , $\text{Fe}_2(\text{SO}_4)_3$, AgNO_3 , MnSO_4 and HCl by Korean kaolin. (14–24) Varying amts. of each electrolyte were added to 10 g. of Korean kaolin, one of the purest kaolins in the world, and 300 cc. of water; the mixts. were agitated for several hrs.; after settling, the clarified solns. were analyzed for each electrolyte, SiO_2 , Al_2O_3 , Fe_2O_3 , CaO , MgO and alkalis. Conclusions are: (a) Clay adsorbs inorg. electrolytes, just as it does dyes, and adsorbs considerable amts. of their cations completely, leaving no trace in the solns., as shown in the following table:

| | Amts. of the compds. which 1 g. of the kaolin can adsorb in milli-equiv. | Amts. of the compds. which 1 g. of the kaolin can adsorb completely in milli-equiv. |
|---------------------|--|---|
| $C_{23}H_{25}N_2Cl$ | 0.566 | 0.036 |
| KOH | .634 + x | .027 |
| $Ba(OH)_2$ | .514 + x | .153 |
| K_2CO_3 | .432 + x | .000 |
| KCl | .107 | ... |
| $BaCl_2$ | .153 | .052 |
| Fe_2Cl_6 | .287 | .123 |
| $Fe_2(SO_4)_3$ | .374 | .124 |
| $AgNO_3$ | .178 | .027 |
| $MnSO_4$ | .205 | .054 |
| HCl | .357 + x | .108 |

(b) Only cations take part in the adsorp.; (c) The adsorp. is chiefly affected by the nature of anion and the soly. of the resulting kaolinate in water; as to the former, adsorp. of electrolytes with same cation decreases as the acidity of anion increases; as for the latter, adsorp. of electrolytes with same anion increases as the soly. of resulting kaolinate decreases; (d) Cations of the electrolytes displace the equiv. amt. of cations. The peculiarly rising inclinations of the adsorp. curves for some electrolytes owe probably to the presence of the kaolinites of several cations on the surface of clay; (e) General tendency of the adsorp. equil. is such that acid reacts first with kaolinites while alkali reacts first with kaolinic acid; neutral salt acts only to displace the cations of kaolinites. (13) The effect of dilution on the adsorp. Expts. with each 10 g. of the kaolin, each 0.1 g. of cryst. $BaCl_2$ and 50–1200 cc. of water show that the equil. is not materially affected by dilution; it is explained by means of the mass-action law. (14) Measurement of plasticity of clays by means of manganous sulphate. The amts. of manganous sulphate which were adsorbed by each 10 g. of 16 clays are compared with their air shrinkage, surface factor, tensile strength, binding power and plasticity-water. The result agrees better with fact than the dye. Moreover, the salt is obtainable in very pure state and can be estimated more accurately than the dye. S. K.

A process of purifying and utilizing waste ceramic raw mats. JIROKICHI KUMAZAWA. *J. Jap. Ceram. Assoc.*, **33** [386], 41–56(1925).—K. studied the purification of ceram. raw mats. by chlorine. The known method of bleaching them as they are by chlorine at high temp. is useless, because they are deprived of plasticity. Therefore the author tried the bleaching of formed bodies in biscuit firing. The following table shows the temp. ranges, in which typical Japanese raw mats. and bodies produce biscuits with suitable strength and porosity:

| | |
|--|-------------|
| Gairome, Kibushi, Korean kaolin and bodies made of them..... | 900–1050°C |
| Aizu-ware (liparite body, contg. small amt. of lime)..... | 900–950°C |
| Tobe-, Arita- and Kutani-wares (liparite bodies)..... | 1050°C |
| Amakusa stone (semi-decomposed liparite)..... | 1050–1100°C |

Exptl.: A small coal-fired muffle kiln, 2' high, 1.5' wide and 1.8' long, with two shelves was used, chlorine being introduced through a hole at the center of the door and drawn through two lower holes in it. Biscuit firing at 940°C was not satisfactory, though it was better than that at 800°. The firing at 1000°, the gas being introduced for six hrs., gave a better result. S. K.

Elasticity of minerals and its measurement. A. JOHANNSEN AND T. C. PHEMISTER. *J. Geol.*, **33**, 368–71(1925). H. H. S.

Combination of water in zeolites. V. ROTHMUND. *Rec. trav. chim.*, **44**, 329–

39(1925); *Jour. Soc. Chem. Ind.*, **44B**, 498(1925).—Discusses existing data concerning the nature of the combined water in zeolites. Although cryst. in structure, zeolites closely resemble colloids like silica gel and permutite in their behavior. H. H. S.

Pentaborates: a new type of alkali borate. V. AUGER. *Compt. rend.*, **180**, 1602-4(1925); *Jour. Soc. Chem. Ind.*, **44B**, 498(1925).—Solns. of B_2O_3 and borax, or potassium tetraborate, are fractionally crystd., resulting in a deposit of microcryst. prisms of compn. $R_4B_{10}O_{17}$, $5H_2O$, or, as the author thinks more likely, $R_2HB_5O_9$, $2H_2O$. H. H. S.

The measurement of the density of porous and pulverulent substances. O. SCARPA. *Ann. chim. applicata*, **14**, 360-7(1924).—The inconveniences and inaccuracies of the ordinary pycnometer and volumenometer methods are overcome by new forms of app. *Pycnometer.* The dried substance is weighed in an ordinary pycnometer and the latter is put in a desiccator with a ground-glass air-tight cover. Through a rubber stopper in the cover runs a funnel, the stem of which is drawn out almost to a capillary. This fine open end leads into the mouth of the pycnometer directly over the substance. Where the stem of the funnel flares into the cup of the funnel is a plug, preferably a rod with a rubber end. The desiccator also has a side-neck so that it can be exhausted by suction. With the pycnometer in position the system is sealed and the desiccator is exhausted for about 1 hr. The cup of the funnel is then filled with H_2O free of air and the plug in the funnel is opened so that H_2O runs in drop by drop and fills the pycnometer, suction being continued. The method is otherwise the same as usual, but is more accurate because of more nearly complete removal of air than long boiling. *Volumenometers.* Two new types are described, which in form and in operation are too complicated for a brief yet adequate description. They are described and illustrated in full detail with the mathematical principles involved, and the original should be consulted. The second is essentially an improved modification of the Oberbeck volumenometer (cf. Lo Surdo, *Nuovo cemento*, **12** (1906)). (C. A.)

Mechanical thermostats. J. R. ROEBUCK. *J. Optical Soc. Am.*, **10**, 679-90(1925).—A critical review. (C. A.)

Design of a thermocouple for measuring surface temperatures. J. G. KING AND A. BLACKIE. *J. Sci. Instruments* **2**, 260-4(1925).—The instrument is used for measuring surface temp. of boilers, etc. and is accurate to 5° in range from 80° to 160° . (C. A.)

The crystal structure of the high-temperature form of cristobalite (SiO_2). R. W. G. WYCKOFF. *Am. J. Sci.*, **9**, 448-59(1925).—By means of powd. crystal spectra and the theory of space groups the unit cube of high-temp. cristobalite is found to contain 8 mols. of SiO_2 in the at. positions $8f$ and $16b$ (cf. Wyckoff, "The Structure of Crystals," cf. *C. A.*, **18**, 3531); $a_0 = 7.12 \pm 0.01 \text{ \AA. U.}$ at $290-430^\circ$; $d_{290} = 2.20$; closest distance O-Si = 1.541 \AA. U. The absence of discernible mols. in this form of cryst. silica and the distinctly lower scattering power per electron of O as compared with Si are discussed. (C. A.)

The surface tension of clay slip. W. O. OSTWALD AND W. RATH. *Kolloid-Z.*, **36**, 243-8(1925).—In some respects doughs and magmas such as clay slip are like solids, in others they are like liquids. Clay slip will pass through small tubes and form drops at the end of a tube as liquids do. The app. used to det. surface tension was a stalagmometer with tubes 0.5 cm. in diam. The tip from which the drops fell was enlarged on the outside and the bore almost closed at the tip. By means of a 3-way stopcock at the upper end of the tube, suction for drawing the slip into the tube, or pressure for causing it to flow out uniformly could be applied and regulated. The equations used were $\sigma = k_1 \cdot g$ (1); $g = \frac{dv}{dV}$ (2) $v = k_2 \cdot Z^{-1}$ (3), where σ = surface tension, d = the density, v = the vol. of a drop and Z = the no. of drops in the vol. of the stalagmometer: and $d = k_3 c$ (4), if it is assumed that density is proportional to concn. c . From these $\sigma =$

$k_4.d.Z^{-1}$ (5) or $\sigma = k_5.c.Z^{-1}$. The rate of formation of drops was not given, and no correction was made for the shape of the drop. For 3 kinds of clay the drop nos. for all concns. decreased when subjected to mech. treatment. As the concn. of any clay is increased the drop no. increases to a max., when the concn. is between 15% and 20% and then decreases. These phenomena are explained by assuming a structure in the water-clay mixt. Deformation of this structure in the inner part of a body is opposed by viscosity; surface deformations are opposed by surface tension. Each increase in surface disturbs the optimum arrangement of particles. (C. A.)

The general building plan of matter in the colloidal state. I. The form and the chemical composition of dispersed particles in suspensoid solutions and precipitates. P. P. v. VEIMARN. *Kolloid-Z.*, **36**, 237-40(1925).—The idea, that colloidal particles are composed of complex chem. compds., recently enunciated as new, has been used by V. for 18 years. About 20 references are given to confirm this. This idea had led to the following ideas regarding the precise form of colloids. (1) The particles of suspensoids are ultramicroscopic crystals, or aggregates of the finest ultramicroscopic crystals. (2) These aggregates may contain only one kind of crystals or more than one kind. (3) These crystals may grow in size and to various shapes, especially long needle-shape. (4) The aggregates will have a more or less rounded shape and be formed like a flake or a feather. The chem. nature of colloids is given under 12 heads: (1) When some substance X adsorbs some other substance Y , the compn. of the outer layers will be XY . If the crystals of X are large the proportion of Y will be negligible. (2) If the particles are progressively made smaller the value of Y increases and may become relatively large. (3) The cause of the sorption may be the same as the cause for the formation of complex compds., or it may be the formation of an insol. ppt. with the surface of the particle. (4) When the particles are very small so that the surface layer is the major part of the particle, one cannot draw a sharp line between the 2 classes mentioned in (3). (5) An aggregate of crystals in whose pores is the dispersion medium and all it carries will be yet more complex in nature than any single crystal. (6) The collection of crystals into aggregates changes the compn. (7) As the crystals grow larger the amt. of enclosed material decreases and the crystals become relatively purer. (8) As the concn. of the "Dispergator" D increases, Δ in the formula $XD\Delta$ increases. (When equal vols. of $BaCl_2$, $(a + X)$ normal, and $MnSO_4$, " a " normal, are mixed, $BaCl_2$ is the "Dispergator.") When the excess of $BaCl_2$, X , is plotted against the life of the resulting colloid there is a max. life for mixts. for each value of a . On the 2 sides of each curve will be pairs of points representing colloidal particles of the same life period but of different compns. (9) Purifying colloidal particles by dialysis or any other method removes the "Dispergator," changes the compn., and makes any analysis futile. (10) Sizes of particles and compn. are changing continually. (11) and (12) As the particles grow, $XY\Delta \longrightarrow XY_0 \longrightarrow X$, or $\lim (XY\Delta)_{t \rightarrow \tau} = XY_0 = X$. It is useless to talk of pure phys. or pure chem. theories. The theory is physicochem. (C. A.)

The equilibrium of the series cryolite-alumina. G. A. ROUSH AND M. MIYAKE. *Trans. Am. Electrochem. Soc.*, **48**, preprint(1925).—The soly. of Al_2O_3 in cryolite in solid soln. is found to extend to about 12% and of cryolite in Al_2O_3 to about 77.5%. These points are confirmed by metallographic examn. (C. A.)

Micrographic examination of the structure of clays. BERTRAND. *Recherches et inventions*, **4**, 825-33, 841-51(1923).—True mica does not occur frequently in clays, and the presence of alkalis must be attributed to some other mineral. As he cannot identify microscopically any such mineral, B. concludes that the alkalis were absorbed when they were liberated by the disintegration of the feldspars from which the clays were produced. (C. A.)

Calculation of the heating value of a fuel from its ultimate analysis. R. VONDRÁČEK.

Montan. Rundschau, **17**, 317-21 (1925).—The usual form of the Dulong formula $Q = 81C + 290[H - (O/8)] + 25S$, where Q is the (higher) heat of combustion and the letters represent the % of the resp. elements in the fuel, is revised with the introduction of a variable coeff. for C, viz., $Q = (89.1 - 0.062C')C + 270[H - (O/10)] + 25S$, where C' is the % C in the pure combustible, i. e., is C cor. for the ash, H_2O and S contents. This formula, unlike the usual one, holds over the C range 45-90%. The % error in the heat of combustion calcd. for various C-contg. substances is as follows, for the new and old expressions, resp.: Bituminous coal, -1.0 to +0.3, -2.2 to +0.9; brown coal, -2.0 to +0.3, 0 to -6.9; peat, +0.7, -7.2; wood, -0.3, -11.8; cresol, +0.1, +0.8; cellulose, -0.3, -13.6; crude oil, -0.5, +5.7. The (lower) heating value of the fuel may be obtained from either of the above expressions by addn. of the term -6 (% moisture). (C. A.)

PATENTS

Process for producing aluminum chloride. FRANK W. HALL. U. S. 1,549,766, Aug. 18, 1925. The process of making aluminum chloride that comprises heating acid sludge to render it liquid, mixing the liquid with powdered aluminum ore to form a mixt. containing the ore in suspension, coking the mixt. and chlorinating the product to form aluminum chloride.

Process of increasing plasticity of fullers' earth. INST. PHYSICS AND CHEMISTRY. Japan. 2,236, Nov. 17, 1924. In the process of kneading fullers' earth or a mixt. of fullers' earth and other minerals with water, a small amt. of oxalic acid or an acid oxalate is added. The acid or its acid salts deflocculate the earth and increase its plasticity. S. K.

Process of bleaching clay and rock powder. ATSUSHI MATSUBARA. Japan. 62,418, Feb. 17, 1925. A low-grade clay is put in a tank with a stirrer and 2-5 N H_2SO_4 is poured in. Then hydrogen sulphide is passed through the soln. which is heated to and kept at 50-70°C. Ferric compds. in the clay are reduced by the gas and are dissolved by the acid. In about 1½ hrs., the iron, together with greater part of manganese and chromium, will be dissolved. Then the product is elutriated to get rid of undecomposed colored minerals and sands. Semi-decomposed liparite, pegmatite, quartz, talc, agalmatolite, barium sulphate, etc. may be treated in a similar manner. S. K.

BOOKS

The physical chemistry of igneous rock formation. London: The Faraday Society. Price 6s 6d.

Base exchange in soils. London: The Faraday Society. Price 5s.

A system of physical chemistry. Vol. II—Thermodynamics. W. C. MCC. LEWIS. Fourth edition. Pp. VIII + 489. London: Longmans, Green & Co., 1925. Price 15s. H. H. S.

General

Raw materials of the ceramic industry. ANON. *Chem. Met. Eng.*, **32**, 618-20 (1924).—Lists work being carried on by the Bur. of Stand. on clays. M. E. M.

Pulverized fuel. DAVID BROWNLIE. *Chem. News.*, **130**, 355-8, 374-7, 387-90; **131**, 7-9, 22-4, 41-4, 53-6 (1925).—A general description of the efficiency of pulverized fuel for elec. plants and the use of refuse fuel at colliery. B. gave data on several American plants and the efficiency of pulverized fuel in these plants. The use of a pulverized fuel from the low carbonization systems would be an outlet for the product which is at present nearly unusable. Low carbonization is a source of fixed nitrogen and is of interest to England. The article is to be continued and in the first part B. deals with electrical power plants utilizing powdered fuels and gives advantages and various systems of pulverized fuel manipulations. S. S. C.

Ventilation. E. R. LUDLOW. *Trans. Ceram. Soc. (Eng.)*, **23**, 340-56(1923-24).—Advocates the use of natural draft ventilators, especially of a certain type, on potters drying ovens. H. F. S.

Casein silicate paint. C. H. BUTCHER. *Indus. Chemist*, **1**, 153(1925).—Casein silicate paint is a liquid or paste prepd. by mixing casein with sodium silicate; the casein is dissolved in caustic soda and stirred up with the alkali silicate and a sufficient quantity of diatomaceous earth, and is then passed through the paint mill. The product may be tinted by the addition of lime-proof colors up to 10%. Powdered asbestos waste is sometimes added for the production of fireproof paint. Ordinary casein paints in the form of a thick cream, which is diluted with water for use, are prepared by incorporating the finely powdered body with the pigment and then mixing this product with sufficient casein soln. Casein (100 pts.) dissolved in 92° Tw. soda solution (15 pts.) and mixed with kaolin or prepd. chalk (885 pts.), suitably pigmented, is a typical recipe. O. P. R. O.

Ceramics. C. C. KRAUSSE. *Proc. Am. Gas Assoc.*, **1924**, 615-23.—A brief general discussion of the methods in use in the ceramic industry and of the historical development of the industry. (C. A.)

PATENT

Rust-removing compound. JOHN J. VAN BUHLER. U. S. 1,548,495, Aug. 4, 1925. The metal cleaning compound comprising 24 parts by volume of raw linseed oil, 56 parts of denatured alcohol, 48 parts hydrochloric acid and 13 parts acetic acid.

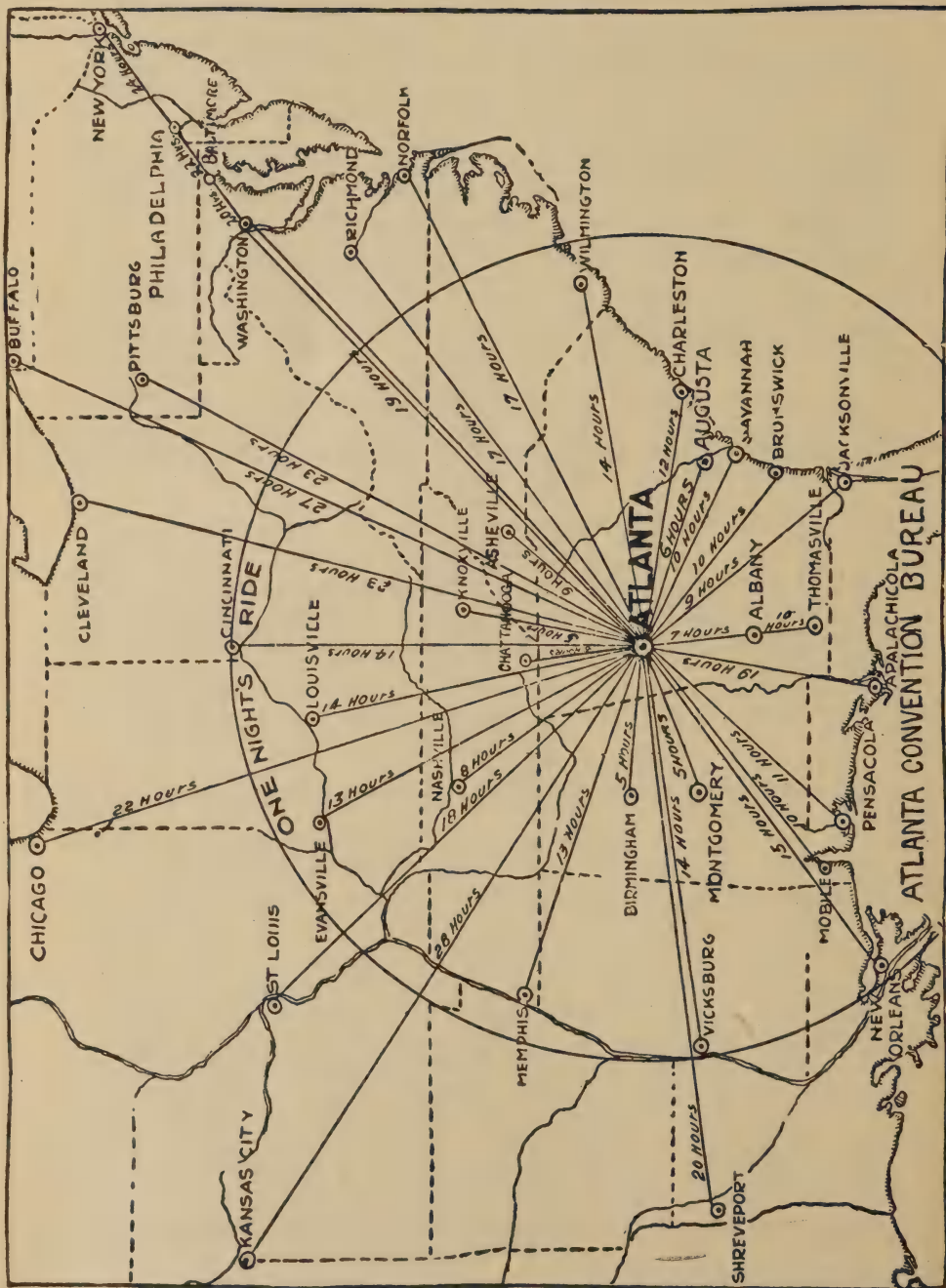
CORRECTION

The price of "A Text Book of Glass Technology" by Hodkin and Cousen in the August *Ceramic Abstracts*, Book Review Section, was listed as \$10.00. The correct price of this volume is \$12.00.

HOW FAR IS IT TO ATLANTA, GEORGIA?

Annual Meeting—American Ceramic Society

Feb. 8-13, 1926



CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from *Chemical Abstracts* by cooperative agreement.

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Abrasives

PATENT

Binder composition for abrasives and other materials and method of making same. HENRY R. POWER. U. S. 1,553,105, Sept. 8, 1925. The method of making a cement compn. which comprises forming a cement mixt. contg. calcium hydrate and subjecting the mixt. to the action of carbonic acid gas to thereby convert the calcium hydrate into a calcium carbonate.

Art

How Palissy, poor village geometer, became world famous potter. ANON. *Pottery, Glass & Brass Salesman*, 32 [2], 15(1925). (Told in "The Penny Magazine" in 1847).—An account of the 15 yrs. of expts. against incredible odds which led to his final perfection of porcelain. F. G. J.

Cement, Lime and Plaster

Cement industry in Australia. ANON. *Jour. Soc. Chem. Ind.*, 44, 820(1925).—The works of the Standard Port. Cement Co. at Kandos, New South Wales, which adjoin the works of the Kandos Cement Co. will shortly be completed to meet the ever increasing Australian demand. H. H. S.

Fire resistance of concrete columns. W. A. HULL AND S. H. INGBERG. Bur. of Standards, *Tech. Paper* 272.—The study of the fire resist. of concrete columns included fire tests of 62 columns under working load and compression tests of 16 comparable columns not subjected to fire tests. A few columns were of plain concrete, others had vertical reinforcement inside of lateral reinforcement in the form of spirally wound wire, as is now generally used where heavy loads are supported. H. F. S.

The processes in firing synthetical raw flour. WALTER DYCKERHOFF. *Zement*, 14, 174-7(1925).—A mixt. of CaO, SiO₂ and Al₂O₃ analogous to Port. cement which was heated according to the methods used by the technician after firing consisted of about $\frac{2}{3}$ of β -bicalcium silicate enriched by CaO which is absorbed to a considerable amt. in solid soln., furthermore of tricalcium aluminate, pentacalcium trialuminate and very little CaO. The unstable β -bicalcium silicate fixed by the final melting and enriched by CaO is the carrier of the hardening. The fixation of the unstable modification is the main part of the problem of mfg. binding agents able to harden. The quality of the cement depends in the first place upon absorbing lime in solid soln. By quick cooling this solution is also stable. W. S.

Contribution to the petrography of the modern Portland cement clinker. CARL

BIEHL. *Zement*, **14**, 379-82, 397-9(1925).—By microscopical investigation of the clinker it is possible to draw conclusions as to firing, sintering, kind of kiln, cooling, influence of fluxes, chem. compn. and quality of the cement made of that clinker. Clinkers with good and rich crystal formation (alite) were produced by high fire and influence of flux. The best cements are obtained from sudden cooled clinkers, where a complete crystn. of the minerals is prevented and a storage of energy in the glass is reached which becomes effective in cooling. W. S.

The hydration of high calcium aluminates. KRISTO RADEFF. *Zement*, **14**, 177-82 (1925).—Hydration of tricalcium aluminate results in tricalcium hydro aluminate, that of monocalcium aluminate and pentacalcium trialuminate is tricalcium hydro aluminate if there is sufficient lime for its formation. In hydrating the compn. $4\text{CaO} \cdot \text{Al}_2\text{O}_3$ lime is given off. There were no marks that proved the presence of a tetra calcium hydro aluminate. Alumina hydrate combines with calcium hydrate to crystallized aluminate. The aluminates tend to form the ratio $1\text{CaO} : 3\text{Al}_2\text{O}_3$. W. S.

The importance of the sulphates of slag on the durability of the slag products and on their behavior with changing humidity. H., W. AND A. EURICH AND H. NITZSCHE. *Zement*, **14**, 338-40, 358-63, 389-90(1925).—According to thorough investigations it is recommended to limit the contents of sulphates to 1% CaSO_4 and 2% other sulphates, and to work with refrac. cement if a higher content of sulphates cannot be avoided. W. S.

PATENTS

Dental cement and process of making same. PAUL POETSCHKE. U. S. 1,552,341, Sept. 1, 1925. A dental cement powder comprising a compd. composed of acid sol. calcined zinc silicate. A dental cement powder comprising a compd. composed of calcined zinc silicate and calcium fluoride. The process of producing a dental cement powder which comprises calcining pptd. zinc silicate to form a compd. which is decomposable by phosphoric acid to yield a colloidal jelly.

Production of quick-setting lime products by the addition of an aluminum fluoride. MAJOR E. HOLMES and GAIL J. FINK. U. S. 1,554,183, Sept. 15, 1925. A plastic mat. having quick initial setting properties comprising hydrated lime and an aluminum fluoride.

Production of quick-setting lime products by the addition of zeolites. MAJOR E. HOLMES and GAIL J. FINK. U. S. 1,554,184, Sept. 15, 1925. A plastic mat. having quick initial setting properties comprising hydrated lime and a zeolite.

Enamel

Turning a poor enameling furnace into a good one. HOMER F. STALEY. *The Ceramist*, **5** [3], 144-9(1924).—By converting an inefficient closed muffle type fur. into a semi-muffle type fur. 70-75% fuel saving was accomplished. Data and diagrams are given. A. E. R. W.

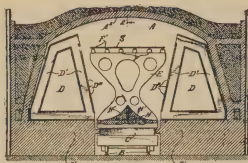
Special sands. W. M. WEIGEL. *The Ceramist*, **5** [3], 177-83(1924).—Portions of interest to ceramists of Bur. Mines Repts. of Invest. No. 2615—"Sand Blast Sand," and No. 2622—"Filter Sand for Municipal Water Supply" (1924). A. E. R. W.

The porcelain enameling of iron castings. WM. THOMASON. *Ind. Chemist*, **1**, 273-6(1925).—A review. (C. A.)

Research on enamel raw materials. M. C. CHOW. *J. China Soc. Chem. Ind.*, **3** [1], 9-38(1925).—Analyses. (C. A.)

PATENT

Method of and apparatus for enameling. CONRAD DRESSLER. U. S. 1,552,475, Sept. 8, 1925. The method of enameling both sides of flat articles in a tunnel kiln



of the muffle type by means of a convection current circulation of the kiln chamber and radiant heat, which consists in supplying heat at substantially the same rate to each side of the article by setting up a convection current circulation of the kiln atmosphere in directions transverse to the length of the kiln while holding the articles in a horizontal position in the kiln chamber with their upper sides exposed

to radiant heat from the roof of the kiln and their lower sides exposed to radiant heat from the hot kiln walls at the sides of, and beneath, the articles.

Glass

The cost of melting glass by fuel oil and coal. T. E. KIRCH. *Nat. Glass Budget*, **41** [7], 10(1925).—Lists the equipment needed for each type of fuel and the items contributing to operation costs. Not only the cost of the fuel and its calorific value must be considered but also the first cost and the operating cost. F. G. J.

Old stained glass. L. B. SAINT. *Nat. Glass Budget*, **41** [15], 3(1925).—An address at the annual meeting of the Stained Glass Manufacturers Assn. F. G. J.

Glass Container Association takes up statistical work. ANON. *The Glass Worker*, **44** [46], 17(1925).—At their convention they inaugurated a statistical department and adopted the slogan "See what you buy—buy in glass." F. G. J.

Winslow Glass Company prepares to operate new unit. E. P. ARTHUR. *The Glass Worker*, **44** [48], 17(1925).—A description of a thoroughly modern milk bottle factory to be opened at Columbus, Ohio, about Sept. 1. F. G. J.

Dunbar Flint Glass Corp. soon to operate addition. ANON. *The Glass Worker*, **44** [49], 17(1925). F. G. J.

Performance of glass melting tanks. W. O. AMSLER. *The Glass Worker*, **44** [49], 19(1925).—Reprinted from *Fuels and Furnaces*. F. G. J.

World's largest Fourcault system factory. ANON. *The Glass Worker*, **44** [47], 19(1925).—A 12-mach. plant, under construction for two years, will soon start at Zeebrugge, Belgium. F. G. J.

Old Sandwich glass designs. CHARLES M. STOW. (From the *Boston Transcript*.) *Pottery, Glass & Brass Salesman*, **32** [1], 13(1925).—The celebration of the 100th anniversary of the opening of the famous glass works founded by Deming Jarves includes, besides a loan exhibition of products, a book of drawings of patterns of epergnes, lamps and vases and a notebook of formulas for making color stain in Deming Jarves' own handwriting. F. G. J.

The effect of composition on the viscosity of glass. III. Some four-component glasses. S. ENGLISH. *Jour. Soc. Glass Tech.*, **9** [34], 83–98(1925).—With a soda-lime glass as a starting point, mol. quantities of (1) magnesia and (2) alumina replaced mol. quantities of lime thus giving a series of 4 component glasses in each of which the relative mol. quantities of sodium oxide and silica remained constant. The detn. of the viscosities of these glasses was carried out through the lower and higher ranges of temps. in exactly the same way as described in Pts. I and II of this paper (*Ceram. Abs.*, **4** [1], 5; **4** [3], 63). At temps. 1300°C to 1400°C magnesia substituted for soda in sodium trisilicate, causes a greater increase in viscosity than does a mol. equivalent quantity of lime. At temps. 1400–800°C the viscosities of soda magnesia silicates increase at more uniform rates than do the corresponding soda-lime glasses. Substitution of alumina for lime caused an increase in viscosity at 1200°C and 1400°C but up to 0.1 alumina at 1000°C and 800°C caused a decrease in viscosity. Magnesia substituted for lime up to 0.40 mol. caused a decrease in viscosity from 800–1400°C. R. M. K.

Glasshouses on the Wear in the eighteenth century. FRANCIS BUCKLEY. *Jour. Soc. Glass Tech.*, 9 [34], 105-11(1925).—The names and a short history and description of glasshouses on the Wear in the 18th Century are given. R. M. K.

A note on the changes of color of selenium glasses during annealing and reannealing and by exposure to light. A. COUSEN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 9 [34], 111-7(1925).—Samples of yellow and pink soda-lime glasses contg. small quantities of selenium were heated in an elec. fur. at 25° temp. intervals 500-625°C. Samples were also exposed to light for 13 months. Conclusions are that final color depends on starting color, and temp. and time of annealing. Colorless glasses remain colorless, yellow remain yellow, and pink tend to yellow on hgt. Effect of exposure to light essentially reverse of the effect of hgt. R. M. K.

The production of colorless glass in tank furnaces with special reference to the use of selenium. III. The influence of arsenious oxides and other constituents of the batch. ARNOLD COUSEN AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 9 [34], 119-27 (1925).—Attention is called to contents of the previous paper (*Ceram. Abs.*, 4 [2], 34 (1925)). The effect of arsenious oxide as a decolorizing agent was tried out on a glass (batch: sand 1000, soda 370, limespar 300) both in the presence of selenium and in its absence. Temp. and duration of melting were carefully controlled. Results show arsenious oxide to be a necessary factor in decolorizing glass with selenium. Amt. of arsenious oxide is governed by the time and temp. The minimum should be 30 times amt. selenium. Arsenious oxide is itself a decolorizer. Antimony oxide or calcium phosphate are not satisfactory substitutes for arsenious oxide. Rules for the control of pink color in glass are given. R. M. K.

Some notes on improvements in gas producers. J. S. ATKINSON. *Jour. Soc. Glass Tech.*, 9 [34], 127-32(1925).—Attention is called to the fact that Chapman Automatic Gas Producers in use were proving to be a success. A half-tone of a cross-section of this producer is shown and its outstanding mech. features are described. Some analyses of gas from such a producer are given. Its chief advantages are listed as follows: (1) It has no heavy moving parts; only those doing the work are moved; (2) first cost is lower than other producers; (3) it is simple in operation; (4) the rate of gasification is high; (5) the rate of ash removal is uniform and thus aiding in producing a uniform fuel bed and uniform quality of gas; (6) the upkeep is low. R. M. K.

An attempt to improve the qualities of glasses intended for lamp-working purposes. W. E. S. TURNER. *Jour. Soc. Glass Tech.*, 9 [34], 133-47(1925).—This article deals with expts. to improve alkali-lime glasses for surgical purposes. Compns. of glasses worked with are given. These glasses were tested for melting and working properties, and for durability. Practical lamp-working tests were made. Tables give data regarding the properties studied. R. M. K.

Materials used in the glass industry. B. STRAUSS. *Diamant*, 47 [22], 443(1925).—A discussion of various alloys as substitutes for cast iron for making molds. F. G. J.

Recovery of waste heat from glass furnaces. P. MEYER. *Diamant*, 47 [22], 445(1925).—Not much progress has been made as compared with the steel industry. F. G. J.

Development and investigation of faults in glass. L. SPRINGER. *Diamant*, 47 [22], 445(1925).—Describes and explains the typical faults. F. G. J.

The development of matt and reflecting iridescence on glassware of all sorts. O. PARKERT. *Diamant*, 47 [23], 467(1925).—Formulas are given. F. G. J.

Cement for chemical glasses to stand fire. ANON. *Oil & Color Trades Jour.*, 68, 726(1925).—Mix equal quantities of wheat flour, fine powdered Venice glass and pulverized chalk with half the quantity of fine brickdust and a little scraped lint in white of

egg. This mixt. is to be spread upon a linen cloth and applied to the cracks of the glasses, and should be well dried before put into the fire. O. P. R. O.

Glass industry in Belgium. ANON. *Jour. Soc. Chem. Ind.*, **44**, 799(1925).—A new glass works, which covers an area of 17 acres at Zeebrugge, will begin production shortly. Some 3000 workmen will be employed, an industrial town having been built to accommodate them. H. H. S.

Sorption of nitrous oxide and sulphur dioxide by glass. D. H. BANGHAM AND F. P. BURT. *Jour. Phys. Chem.*, **29** [5], 540-50(1925).—Expts. on the sorption of nitrous oxide and sulphur dioxide by a glass surface at 0°C. The glass surface used was a tube of glass wool. The expts. were carried out at a series of pressures ranging from 44 mm. to 640 mm. Observations extended from 52 seconds to 5 days. Summary: The sorption of nitrous oxide by glass reproduces the essential characteristics observed with carbon dioxide, considering any series of const. press. expts. log (sorption) appears to be a single valued function of log (p.⁶.t) the relationship approximating more closely to the linear than in the case of CO₂. Sulphur dioxide also follows the linear log (sorption) log (time) law, but as it was impossible to out-gas the sorbent the pressure exponent was not detd. E. J. T.

Boric acid in chemical-resisting glass. W. E. S. TURNER AND F. WINKS. *Chem. Age*, **12** [315], 629(1925).—It was found generally that the introduction of boric oxide reduced the thermal expansion of the glass and also increased the durability of a glass against the action of water and neutral solns. and, to a certain extent, against acids. It was found from tests that the use of boric oxide had very definite limitations and that when the amt. of boric oxide added to a glass was beyond a certain percentage its value began to disappear and was in some proportions exceedingly detrimental. Tests showed the max. advantage was obtained with between 11 and 14% boric oxide and, in the case of more complicated glasses, between 10.6 and 13.6%. In a paper by the same author on an attempt to improve the working qualities of glass intended for lamp-working purposes glasses of the following compn. were found best:

| SiO ₂ | Al ₂ O ₃ | Fe ₂ O ₃ | CaO | MgO | K ₂ O | Na ₂ O | B ₂ O ₃ |
|------------------|--------------------------------|--------------------------------|------|------|------------------|-------------------|-------------------------------|
| 66.74 | 5.48 | 0.07 | 6.16 | 1.18 | 5.10 | 14.60 | 0.40 |
| 68.16 | 4.27 | 0.06 | 6.48 | 0.71 | 5.32 | 14.57 | 0.22 |

E. J. T.

Boric oxide as a constituent of laboratory glass. ANON. *Chem. Age*, **12** [306], 403(1925).—A discussion of some of the properties of glasses contg. boric oxide, such as lowering of the coeff. of expansion, resistance to thermal and mechanical shock and resistance to attack by acids. E. J. T.

The constitution of glass. A LONDON SYMPOSIUM. *Chem. Age*, **12** [311], 527 (1925).—A brief résumé of the papers presented at the May meeting of the Society of Glass Technology which included: "Glasses as Supercooled Liquids," by G. Tammann; "The Constitution and Density of Glass," by A. Q. Tool and E. F. Hill; "The Ternary System Sodium Metasilicate Calcium-Metasilicate-Silica," by G. W. Morey and N. L. Bowen; "The Viscosity and Allotropy of Glass," by H. L. Chatelier; "The Structure of Quartz and Silica," by Wm. Bragg; "X-Ray Studies of Soda-lime-silica Glasses," by G. W. Morey and R. W. G. Wyckoff; "The Viscosity of Glass," by V. H. Stott. E. J. T.

Society of Glass Technology papers at Newcastle meeting. ANON. *Chem. Age*, **12** [303], 333(1925).—(a) The use of zirconia in glass making and the characteristics which this substance imparts are discussed. The glasses contg. considerable amts. of zirconia were difficult to melt and were viscous like alumina glasses but with a shorter working range than the latter. The zirconia glasses did not exhibit low thermal expansion. Their annealing temps. increased with zirconia content less steeply than correspond-

ing glasses with basic oxides such as lime and magnesia. Replacement of silica by zirconia increased the resistance to alkaline solns. (b) The second paper was on the effect of compn. on the viscosity of glass by S. English. As a starting point a glass of mol. compn. 1.2 Na₂O, 0.8 CoO, 6 SiO₂ and lime substituted by magnesia which lowered the viscosity, and caused the rate of increase of viscosity with falling temp. to become more uniform.

E. J. T.

Modern production of sheet glass. W. E. S. TURNER. *Jour. Roy. Soc. Arts*, 73 [3792], 821-37(1925).—A lecture describing the modern methods of glass manuf. including tables giving the production of glass in this country and abroad, showing Belgium to be the leading exporter of glass in Europe.

E. J. T.

Tank block essentials. S. R. SCHOLES. *The Ceramist*, 5 [2], 92-5(1924).—S. specifies the properties that should be exhibited by tank blocks to meet the requirements of modern practice. Discusses (1) refractoriness, (2) insoly., (3) low porosity, (4) mech. perfection.

A. E. R. W.

Theories advanced in reference to the effect of cullet in glass batches. R. R. SHIVELY. *The Ceramist*, 5 [4], 235-7(1925).—An increased amt. of cullet gives a "stiffer natured" glass. This is attributed by some to an increase in viscosity due to the slightly different composition of the cullet, by others to the cullet's lower content of dissolved gases. S. advocates the mixing of crushed cullet and batch, and condemns the use of cullet from unknown sources.

A. E. R. W.

Annealing of glass. R. R. SHIVELY. *The Ceramist*, 5 [5], 274-8(1925).—S. deplores the general tendency to increase production without increasing leer capacity. For perfect annealing, the glass should be heated to the upper annealing temp. and then cooled slowly to the lower annealing temp. The annealing temp. increases as soda content decreases and lime content increases. The effect of other oxides on annealing temp. is given. S. recommends leers closed at both ends and not over 9 ft. in width.

A. E. R. W.

Coloring glass by means of nickel. KITSUZO FUNA. *J. Japan. Ceram. Assoc.* No. 361, 430-44(1922); *Chimie et industrie*, 13, 99.—NiO gives a purple color to K glass and a brown color to Na glass, the color losing clearness when the quantity of Ni oxide is increased. The bivalent element which enters into the compn. of the glass has little effect, except Ba, which acts on the color. In borosilicates NiO gives a purplish pink. Oxidizing (KNO₃) or reducing agents (K tartrate or As₂O₃) do not interfere with the production of the color.

(C. A.)

The photo-elastic constants of glass as affected by high temperatures and by lapse of time. F. C. HARRIS. *Proc. Roy. Soc. (London)*, 106A, 718-23(1924).—The stress-optical coeff. shows an increase with rise of temp. with the exception of an extra dense flint (PbO = 64.4%). Twelve glasses tested also showed an increase with lapse of time.

(C. A.)

Perfume, the fragrance of femininity. ANON. *Glass Container*, 4 [10], 5-7 (1925).—Points out the desirability of artistic effects in perfume bottles, with illustrations.

W. M. C.

History of glass making. Roman glass. J. F. HEFFRON. *Glass Container*, 4 [10], 14-22(1925).—Descriptive article well illustrated.

W. M. C.

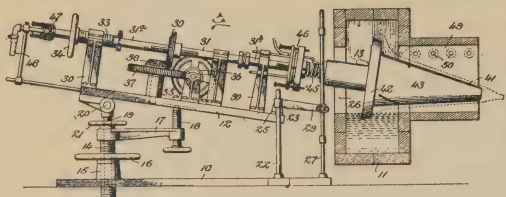
Glass as a raw material in illuminating engineering. ZSCHIMMER. *Glastechn.*, 1, 73-6(1923); *Chimie et Industrie*, 11, 930(1924).—An address on the properties and qualities required of glass used for illumination purposes.

W. M. C.

PATENTS

Glass bulbs. Glass manufacture. COWNSHAW, J. C. MATHER & PLATT, LTD. Brit. pat. 213,375(1923). A device for blowing small bulbs on capillary tubing using a cylinder with a sliding piston. A very simple device.

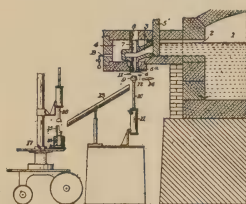
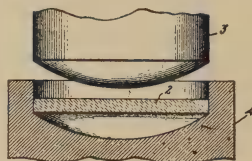
Glass-working apparatus. ALBERT C. WILCOX. U. S. 1,550,995, Aug. 25, 1925. In glass working app., a rotatable member having an inclined surface over which molten glass is adapted to flow continuously towards one end of the member,



towards one end of the member, and means included in said member at its other end to elevate molten glass continuously from a supply and deliver it to said surface.

Process of forming quartz articles. HENRY A. WAYRINGER.

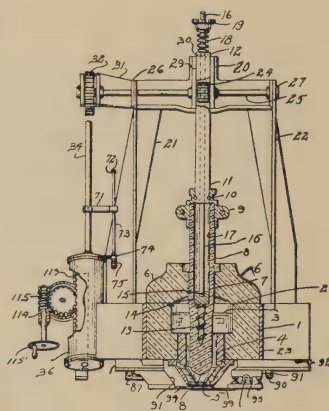
U. S. 1,551,351, Aug. 25, 1925. The method of mfg. quartz articles which consists in casting fused quartz into the form of a mass having a cross-section substantially equal to the cross-section desired in the finished articles, mechanically subdividing said mass when solidified into sections, reheating said section to a temp. of plasticity and molding to a desired form.



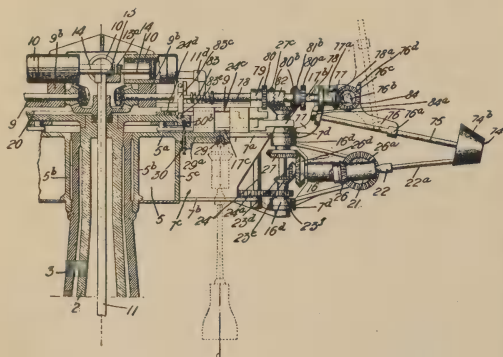
Method and apparatus for feeding glass. BENJAMIN T. HEADLEY, DAVID IRVIN DU BOIS and WILLIAM C. FENNIMORE. U. S. 1,551,513, Aug. 25, 1925. A glass-working app., comprising a feeder cup adapted to contact with a stream of glass, means for operating said feeder cup to maintain the same in contact with said stream for a predetd. length of time and subsequently increase the speed of movement of the cup to withdraw the cup from such supporting contact, means for severing the stream to form a gather,

means for engaging the gather to move the same laterally, and a trough for receiving and conveying said gather, substantially as described.

Glass-feeding apparatus. FRANK O'NEILL. U. S. 1,551,526, Aug. 25, 1925. In the feeding of molten glass from a pool, a plunger, a cylinder including connections for operating the plunger, said cylinder being mounted to have its axis extend at an angle to the axis of the plunger, and an adjustable mounting for shifting the cylinder along its axis.

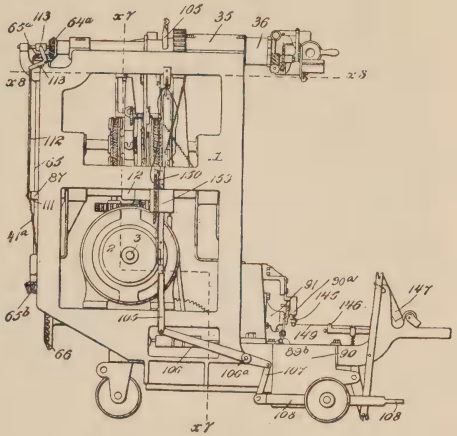


Glass-working machine. BENJAMIN DAY CHAMBERLIN. U. S. 1,551,934, Sept. 1, 1925. In a glass-working mach., the combination with a support for a glass-carrying spindle, of a rotating marverer, successive points of which are brought into contact with the glass

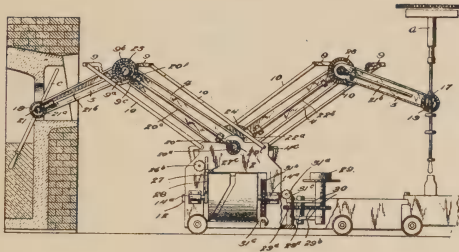


on the rotation of the marverer, which points are successively closer to the axis of the spindle, and means for rotating the spindle.

Machine for producing blown-glass articles. ORIN A. HANFORD. U. S. 1,551,936, Sept. 1, 1925. In a glass blowing mach., the combination with a movable blowpipe having several operative positions, of a separable mold, means for moving the blowpipe in respect to the mold from one of said positions into another of said positions for elongation of the gather thereon and to present the gather to the mold, and means for automatically closing the mold.



Apparatus for gathering glass and the treatment thereof on blowpipes. BENJAMIN D. CHAMBERLIN. U. S. 1,551,935, Sept. 1, 1925. In a glass

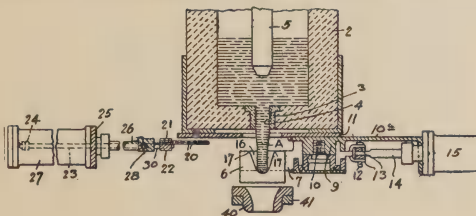
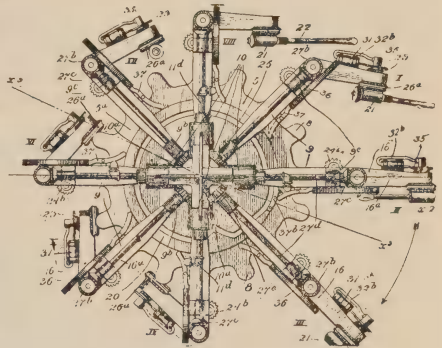


working mach., the combination of two blowpipe receiving devices, means for translating such blowpipe devices with the blowpipes thereon in the same vertical plane, a marverer located in the said plane and acting upon the glass on the blowpipes carried on said devices.

Machine for the production of glass articles. BENJAMIN D. CHAMBERLIN. U. S. 1,551,933, Sept. 1, 1925. In a mach. for the production of glass arti-

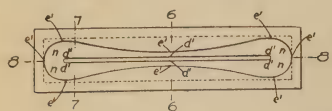
cles, the combination with a horizontally traveling frame, of a blowpipe carried thereby and movable in respect to the frame in the direction of, and at angles to, the movement thereof, substantially as described.

Method and apparatus for feeding glass. OLBERT C. NOBLE. U. S. 1,552,497, Sept. 8, 1925. The method that comprises causing a stream of molten glass to flow vertically toward a mold having a downwardly converging glass-receiving cavity, intercepting the end of the said



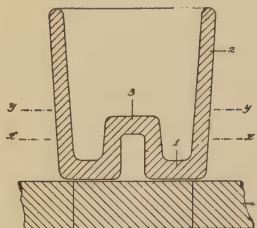
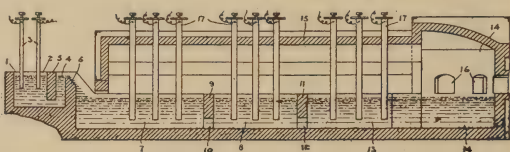
stream in a gathering cup having a cavity converging downwardly at an angle greater than the angle of convergence of the said mold cavity, accumulating a shaped gather of glass in the said gathering cup, severing the said stream at an unattenuated

portion thereof above the said cup, and releasing the said gather from the said cup and permitting the said gather to fall vertically into the said mold cavity.



during drawing, the lower portion of said slot varying in width from the center to the ends thereof.

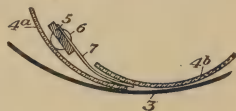
Glass-refining furnace. ALLAN GRAUEL. U. S. 1,552,555, Sept. 8, 1925. A glass refining fur. having a melting chamber at one end and a work chamber at the other end, a plurality of intermediate chambers between said melting chamber and said work chamber, and hgt. electrodes arranged in each of said intermediate chambers.



Pot for melting glass. HANS SCHNURPFEL. U. S. 1,552,884, Sept. 8, 1925. A pot for melting glass, the bottom of said pot comprising a hollow rib, projecting into the interior of the pot and opening to the exterior so that it can be freely traversed by flames and combustion gases.

Method and apparatus for splitting glass cylinders. PAUL R. PIKE. U. S. 1,553,103, Sept. 8, 1925. The method of splitting glass cylinders which includes supporting a cylinder at the bottom portion thereof, burning the cylinder adjacent the bottom portion, rotating the cylinder,

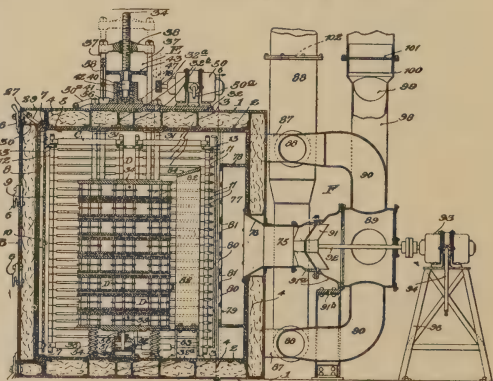
splitting the rotated cylinder adjacent the bottom portion thereof, applying a cutter to the cylinder at the burned portion to effect a split at that point, and causing the insertion of a separator between the edge portions formed by the first splitting operation to prevent scratching of the glass by such edge portion when the subsequent split is made, substantially as described.



receptacle and exhausting the air and gases from said receptacle.

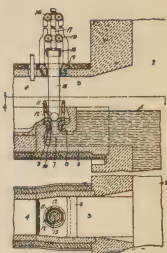
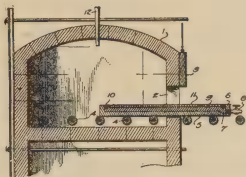
Apparatus for fabricating reënforced glass. WILLIAM C. BULL. U. S. 1,553,667, Sept. 15, 1925. An app. of the class described, comprising an oven, a multiple press device including a stack of horizontally arranged press units accessible through a side wall of the oven, heating means distributed in said oven about the press units, and

Process of treating glass during annealing. JOHN BENNETT. U. S. 1,553,283, Sept. 8, 1925. The process of treating glass consisting in confining said glass while hot in an air-tight re-



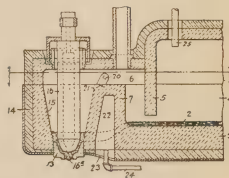
means for coursing air currents through and about said press units parallel to the plane thereof.

Valve for molten glass. GEORGE E. HOWARD. U. S. 1,553,290, Sept. 8, 1925. A valve for molten glass comprising a horizontal partition member provided with an inlet channel and with a vertical opening communicating with said channel, a tubular stationary valve member having its lower end supported on said partition in line with said opening and having an internal annular valve seat and at least one lateral discharge opening above said valve seat, and an elongated vertically movable valve member having a tapered lower end adapted to rest upon said annular valve seat.

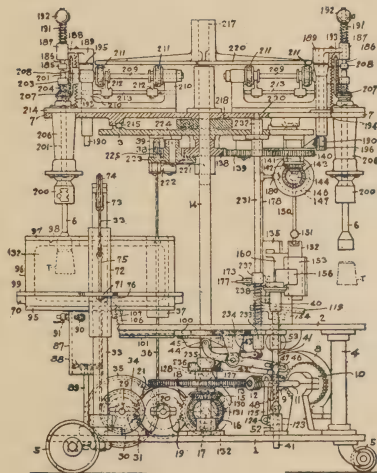


Method of making glass plates. WILLIAM E. HEAL. U. S. 1,553,773, Sept. 15, 1925. The herein described method of making glass plates which consists in placing a layer of glass on the upper surface of a substantially horizontal supporting medium having a lower fusing point than that of the glass, and htg. the glass and supporting medium to a temp. at least as high as the fusing temp. of the glass.

Feeding molten glass. GEORGE E. HOWARD. U. S. 1,553,819, Sept. 15, 1925. In a glass feeding app. the combination of a glass conducting channel comprising a vertical front wall, said channel being formed with a discharge well or passageway extending downwardly, a reciprocating plunger projecting downward into said channel to control the flow of glass therefrom, and a baffle projecting upward from the floor of the channel, said baffle being immediately behind the plunger and extending laterally beyond the side surfaces of the plunger in position to deflect the flowing glass to opposite sides of the plunger.



Machine for fire polishing and finishing glassware. ANDREW J. SANFORD and JOHN B. TOWNSEND. U. S. 1,554,038, Sept. 15, 1925. App. for fire-polishing and finishing glassware comprising a circular series of stations, including a ware-receiving station, a plurality of fire-polishing stations, a finishing station and a ware-removing station, a rotatable carrier disposed above the said stations and carrying a series of vertical punties, means at the said ware-receiving position for automatically attaching the ware to the said punties, a separate htg. chamber at each of the said fire-polishing stations, burnishing and shape-restoring means at the said finishing station, and automatic ware-detaching means at the said ware-removing position.



Heavy Clay Products

Use of slag in industry. K. ELLERSICK. *Feuerungstechnik*, 13 [20], 245 (1925).—Describes complete method and equipment used in the manuf. of brick out of blast fur. slag

with lime bond. Attention is called to the fact that indus. is coming to the use of its by-products in this way for its own construction work as an economic measure.

F. A. W.

The rapid production of vitrified clay ware by the combined effects of heat and pressure. A. J. DALE. *Gas Jour.*, 171, 30(1925).—By using 20 lbs. per sq. in. at 1100°C calcareous earth, Witley marl, cone 16 mixt. and vein quartz became vitrified. This did not occur without press. nor would Stourbridge clay become vitrified under such treatment.

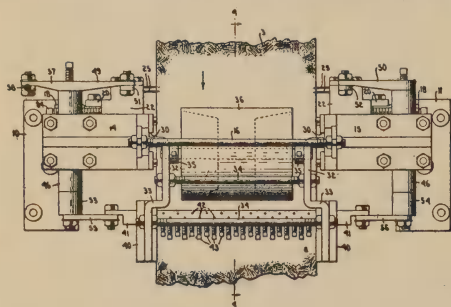
S. S. C.

Report on recommended minimum requirements for masonry wall construction. ANON. Special Pub., Bur. Stand.—The proposed requirements cover all types of masonry mats. They define, for the purpose of the report, certain terms not uniformly interpreted in the industry and regulate the height, spacing of lateral support, thickness, working stresses and quality of materials for solid brick walls and those of hollow construction, walls of hollow units, both clay and concrete, stone and plain concrete. Requirements are given for the construction of fire walls and fire division walls and of masonry partitions, both bearing and non-bearing. One article is devoted to masonry wall requirements; another to new types of masonry construction which may be developed; and still another to the precautions which should be observed in lining or increasing the height of existing walls.

H. F. S.

PATENTS

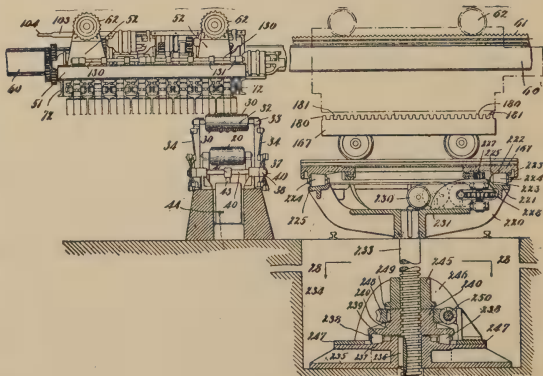
Brickmaking machinery. CHARLES W. HARDWICK. U. S. 1,550,696, Aug. 25, 1925. The combination with a conveying belt adapted to convey a plastic clay article,



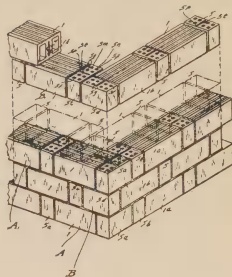
of a plurality of harrowing points past which said belt moves, means for holding said points from moving along said belt while permitting them to move at right angles thereto, and a gaging device movable with said points and limiting their entrance into the clay bar.

Apparatus for automatically hacking brick. GRAFTON E. LUCE. U. S. 1,551,890, Sept. 1, 1925. App. for handling articles comprising a movable

carrier adapted to be supported from an overhead position and having a plurality of independently movable article engaging portions, means to position said carrier in alinement with a support on which the articles to be moved are placed, means for effecting successive relative movement between the article receiving portions of said carrier and the said support, means to move the carrier successively for said successive loading positions and mechanism for effecting a loading action by a relative substantially vertical movement of the article receiving portion and the support.



Hollow-tile flemish-bond wall construction. FREDERICK HEATH. U. S. 1,553,858, Sept. 15, 1925. A wall construction, consisting of hollow blocks arranged in courses and comprising two forms of blocks, one form having three longitudinal voids, and the other form extending transversely of the wall and having vertical voids, its length being equal to the width of the longitudinal blocks and its height equal to the height of that block, and arranged in the wall at intervals without destroying the even continuity of the mortar beds the corners being formed by the vertical void blocks.



Refractories

The relation between under-load refractoriness, ordinary refractoriness, and composition, physical and chemical, of refractory materials. A. J. DALE. *Gas Jour. Supplement*, **171**, 14-23(1925).—Load tests upon 16 commercial bricks and upon 6 exptl. mixts. were made using 50 lbs. per sq. in. and a htg. rate of 50°C per 5 min. The effect of grog was studied in the 6 exptl. bricks and an empirical equation was devised relative to subsidence and time. The types of failure of the commercial brick were discussed, giving curves showing expansion and subsidence. The effect of texture and porosity upon refractoriness and load behavior was investigated. It was found that the ordinary refrac. is not a reliable criterion of the behavior of fire brick under load conditions at high temps., nor can fusion point be taken as an infallible indication of the rigidity of the brick at lower temps. In the tests all brick showed diminution below 1300°C. The failure is preceded by deformation over an extended range of temp. The rate and amount of deformation d under load at 1350°C is related to time t by the equation $d = t^m/a$, where m is a constant characteristic of the mat. and a is the time required for first arbitrary subsidence. With the exptl. grog mixt. m was lower with high grog mixt. than lower grog mixts. The mats. were classed according to these results. S. S. C.

The influence of oxidizing and reducing atmospheres on refractory materials. A. E. VICKERS AND L. S. THEOBALD. *Gas Jour.*, **171**, 27-30(1925).—Fusions were made in an elec. fur. using various atmospheres and additions of Fe_2O_3 were made to cone mixts. Nitrogen was used as the basis of the report for a standard gas. Air acted on the fusion midway between N_2 and O_2 with O_2 giving slightly higher values. SO_2 and CO_2 act slightly as reducing gases lowering the fusion points as Fe_2O_3 increases. H_2 acts strongly as a reducing gas lowering the fusion 250°C in highest Fe_2O_3 content or 2.5% Fe_2O_3 in Thivier's earth. S. S. C.

Notes on testing for refractoriness and after-contraction: A few experiences with refractories in vertical retorts. T. F. RHEAD AND R. E. JEFFERSON. *Gas Jour.*, **171**, 31-41(1925); *Gas World*, **82**, 625-8(1925).—The various tests on refracs. are discussed and the means of detecting failures from various sources. The question of fusion method was taken up and variations in results described. For after-contraction measuring, pieces of cardboard were used to avoid wear of micrometer. Length of piece measured in four places. The taking of samples was gone into and lab. tests and technic described. In vertical retort work the measurement of expansion was described by the using of a water cooled datum mark. Curves of the expansion of the retort are given. The condition of the flues of a dismantled retort was described and photographs were given showing the state of the refractory. The action of producer gas was well demonstrated in this setting. In all retorts near the nozzles in the flue wearing away of the refractory was evident. In some places spalling was bad while others had little or none. Bad fusion was evident in fire brick retorts and slight in siliceous. Practical indications were

obtained on the regulation of the rate of rise of temperature during the initial heating of a setting, the need of accurate limitations of temp. below a prescribed maximum and a method of applying a modified Mellor and Moore load test result to indus. considerations.

S. S. C.

An investigation of the effects of load temperature and time on deformation of firebrick material at high temperatures. A. J. DALE. *Gas Jour.*, **171**, 41-6(1925).—The study of the effect of rate, load and temp. in tests upon fire brick is reported. The flow of fire brick mat. under stress at temps. within the subsidence range is qualitatively analogous with the stress-flow relations of "plastic" mats. at ordinary temps. and a yield load range flow exists at a given temp. with the subsidence range. At loads below the yield load range, flow under stress is probably viscosity effect. The higher the temp. the lower is the value of the yield load. Providing a certain temp. is exceeded the deformation-temp. relation is an exponential one, i. e., $D = ce^{bt}$ where c and b are constants for a given loading. Below this temp. the deformation-temp. relation is a linear one, i. e., $-D = kt$.

S. S. C.

Some fallacies to be avoided in standardization of load bearing capacity of refractories at high temperatures. T. F. RHEAD AND R. E. JEFFERSON. *Gas Jour.*, **171**, 46-9(1925).—Various load testing methods were reviewed and new means described. The fallacy of heating at 1350°C for 2 hrs. is shown by 2 bricks being heated beyond this at a rate of 50°C per 5 min. The one failing before at 1350° did not fail until 1450°C was reached while the second one started to shrink at 1350°C. The subsidence is compared to that of a viscous mat. The tests were suggested to be made to evaluate the tendency of mats. toward viscous deformation at high temps. under heavy loads and to obtain the plastic deformation under low load at max. working temps. The results of the work showed that a consideration should be made of (1) the temp. at which subsidence becomes apparent, (2) the temp. at which marked acceleration of subsidence occurs, (3) the subsidence range, (4) the effect of load on the temp. extent of subsidence range, (5) the appearance of the piece after testing.

S. S. C.

Alumina-silica minerals in firebrick. W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 23(1925).—Extractions were made on pieces of five fire bricks of various alumina-silica ratios (49-43 to 67-27) both as received and after reheating to cone 18 and cone 26. HF was used for 12 hrs. at constant temp. The amt. of insol. residue increased with increased temp. and analyzed close to the compn. of mullite.

F. G. J.

Some properties of clay-sillimanite mixtures. H. S. HOULDSWORTH. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 33(1925).—Test pieces were prepared of mixts. of Farnley fire clay and commercial sillimanite in various propns. These were tested for drying and firing shrinkage, porosity, true and apparent sp. gr., refractoriness, reversible thermal expansion, resist. to slag attack, and resist. to attack by soda-lime glass. Results are summarized as follows: (1) The addition of sillimanite to clay decreases the drying and firing shrinkages, increases the porosity at higher temps. of firing and (when 50% or more is added) increases the refractoriness appreciably. (2) A mixt. of 95% sillimanite, 5% ball clay has a regular coefficient of expansion from 15-1000°C which is not affected appreciably by differences in the firing up to cone 18. The rapid expansion of fire clays from 100-122°C and from 500-600°C is reduced by the addition of sillimanite. The expansion of a typical fire clay from 600-1000°C is less than that of sillimanite for the same range. (3) Sillimanite bonded with 10% of ball clay has a marked resist. to chem. attack by soda-lime glasses and basic slag. Sillimanite-clay mixts. contg. less than 50% sillimanite are not appreciably more resistant to such attack than fire clay alone.

F. G. J.

Note on the storage of silica refractories. W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 62(1925).—Laboratory tests show loss of strength and increase of spalling

due to exposure. There are definite indications that this is due in part to a slight degradation of the bond as well as to physical effects. F. G. J.

The true specific gravity and after-expansion of lime-bonded silica bricks. W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 66(1925).—Forty bricks were studied. Where lime content is between 1% and 3% there is a sufficiently close relation for practical purpose between time, sp. gr. and deg. of quartz conversion. F. G. J.

Testing of fire-clay brick with special reference to their use in coal-fired boiler settings. R. F. GELLER. *Bur. Stand., Tech. Paper 279*.—Following a conference of Govt. representatives and users and producers of fire clay refracs. held at the Bur. of Stand., a voluminous field survey report was obtained through the coöperation of Stone & Webster and refracs. of 42 brands representative of the product as manufactured in the U. S. were submitted to an extended investg. in the lab. In the lab. the refracs. were subjected to the following tests: (1) An endurance test (in which brick were held at 1450°C for 72 hrs., both with and without load); (2) a reheating test (in which the change in vol. and porosity was detd. after the brick had been held at 1400°C for 5 hours); (3) a quenching test; (4) the standard A. S. T. M. load test, and modifications of this test; and (5) the softening points were detd. by the cone method; and brick of each brand were analyzed chemically and several examd. petrographically. It was found that a close relation existed between data obtained in the endurance, reheating, quenching, and softening point tests, and that these depended to a remarkable extent on the chem. compn. The results indicated that a refrac. which would successfully withstand 15 quenchings from 859°C to running water had a softening point equiv. to at least that of cone 32; that the linear change in the endurance test would not exceed 2% and when transversely loaded the deflection would not exceed 10-32 in.; that the per cent absorption after the reheating test would lie between 6 and 10%; and also that the refrac. should be composed of raw mats. containing not more than 4% flux and 20% uncombined quartz. The results also favor the dry-press process for mfg. brick. It was found that refracs. which appeared of highest quality in the lab. did not always give the highest service, but this was to be expected since no two brands of refracs. were subjected to similar service conditions. The field survey showed, however, that in practically every instance brick fail primarily through erosion, indicating lack of refractoriness and resistance to the fluxing action of molten coal ash. The one exception is the suspended arch in which the refracs. fail mainly by spalling. In addition, the data from the survey indicate that where the life is relatively long the brick fail by erosion while, with a short life, the failure is due to combined erosion and spalling. H. F. S.

The color-tint test for refractories. ANON. *Chem. Age*, **13** [316], 4(1925).—The specimen after cleaning is boiled in a soln. of equal parts of strong hydrochloric acid and saturated aluminum chloride. After cooling it is thoroughly washed in water and then treated for half an hour with a concd. soln. of methylene blue. After washing the tint effect which gradually fades away is observed. The differential tinting produced varies it is said with the firing temp. of the brick, their different constituents and the impurities present. The quartz transformation phases are also revealed by this method. E. J. T.

Use and manufacture of silica bricks. R. JORDAN. *Chaleur et industrie*, **6**, 135-9 (1925).—A discussion of the qualities required and of the defects which must be avoided with a detailed description of the method of manuf. by which these results are obtained. (C. A.)

PATENTS

Refractory and method of making the same. KARL P. McELROY. U. S. 1,551,201, Aug. 25, 1925. In a basic refractory mat. granular fragments of shrunk, burnt dolomite exteriorly provided with a less refrac. layer of dolomite mat.

Refractory brick. WALTER CROW and JOHN C. SCHAFER. U. S. 1,553,143, Sept. 8, 1925. A refrac. body comprising a chemically stabilized body-forming refrac. sintered mat. and a humid heat sintered binder for the mat. coating in the formed body not to detract from mat. refrac. properties and leaving the body superficially sealed and the interior unclinkered.

White Wares

"Pinholes:" causes and remedies. Some due to faulty clay blunging. H. J. PLANT. *Chem. Age*, **12** [301], 14(1925).—Pinholes might be caused in numerous ways such as by the imperfect prepn. of the body mats., imperfect blunging, insufficient aging, a faulty pump, pumping air instead of clay, bad pugging, deleterious press cloths, dust on the molds, perished molds, too much water used by the potter, cost molds being too dry, too wet, or too hot, bad firing and faulty glaze mixture. E. J. T.

Revival of porcelain manufacture in Vienna. ANON. *Jour. Roy. Soc. Arts*, **73** [3772], 385(1925).—A new porcelain factory which was officially opened in Vienna recently is meant, says the U. S. Consul at Vienna, to revive the fame of the Imperial Royal Porcelain factory (K. K. Parzellau-fabrik), which closed its doors in 1864 after 146 years of uninterrupted activities. The factory will produce cups, vases, tea and dinner sets striving for quality and artistic finish. E. J. T.

English and American china clays compared. Impressions of a home producer. J. W. HIGMAN. *Chem. Age*, **12** [301], 8-9(1925).—Observations from a visit to china clay mines located in S. Car., Ga., Va. and Pa. English china clays which are dried by evapn. regarded as superior to the American which are pressed and consequently hard. E. J. T.

Experiments with porcelain glazes. A. PFAFF AND W. RATH. *Trans. Ger. Ceram. Soc.*, **6** [2], 63(1925).—Results obtained with porcelain glazes depend on many factors, such as compn. of glaze, compn. of body, length of firing, compn. of fire gases and duration of firing period as well as fineness of raw materials used. The object of these expts. was to det. by empirical methods to what degree the results obtained with different glazes corresponded with what was to be expected from the glaze formula as devised by Seger, and also the effect of diff. raw materials and firing conditions. Compn. of glazes used was:

| | Al ₂ O ₃ | SiO ₂ | RO | } For all glazes. |
|-----------|--------------------------------|------------------|----------------------|----------------------|
| Glaze I | 0.6 | 6.0 | 0.2 K ₂ O | |
| Glaze II | 1.2 | 6.0 | 0.2 MgO | |
| Glaze III | 1.2 | 12.0 | 0.6 CaO | |
| Glaze IV | 0.6 | 12.0 | | |

Crazing was found where SiO₂:Al₂O₃ was greater than 10, the network of cracks becoming finer with increasing SiO₂. A second batch of the same glazes fired in a similar kiln under supposed identical conditions showed somewhat diff. results, noticeably in the crazing limit. The use of diff. raw materials did not change the general relationship but resulted in a shifting of the characteristics. Further tests were made with the addition of coloring oxides. F. A. W.

Finishing of fired refractories. C. GRUPP. *Tonind. Zeit.*, **49**, 351(1925).—Regarding the milling of brick. W. S.

Electrical melting of quartz according to the vacuum-compression method. HUGO HELBERGER. *Umschau*, **29**, 373-6(1925).—To melt quartz clear and free of bubbles the author used crucibles of silicium carbide. The melting chamber was vacuated and the solidification took place under press. of compressed gases. The best material for optically perfect glass is quartz crystal from Brazil and from St. Gotthard.

W. S.

Some recent developments in the utilization of casting scrap in the casting slip. E. A. SLAGLE AND ANDREW FOLTZ. *The Ceramist*, 5 [3], 140-3(1924).—Casting scrap can be used in casting slip only if p_H value of slip is accurately controlled. The optimum p_H value depends on the clays used. Values used in actual practice are given.

A. E. R. W.

Factory tests for feldspar. JOHN M. KREGER. *The Ceramist*, 5 [5], 260-7(1925).—K. describes expts. proving that a simple fusion test is worth very little to a potter. K. suggests actual introduction of the feldspar to be tested into the glaze batch and testing under actual factory conditions. K. stresses the value of a visit to the source of supply.

A. E. R. W.

Some recent developments in the utilization of casting scrap in casting slip. C. C. TREISCHSEL. *The Ceramist*, 5 [5], 272-3(1925).—The casting scrap is blunged, mixed with water, and its hydrogen ion concn. brought to the same value as the regular combination of body ingredients. T. cautions against using acetic acid to neutralize a body contg. whiting as it causes "pinholing," or the use of the process in a raw slip without first washing out the soda salts as it causes "soda blisters."

A. E. R. W.

Porcelain for electrical purposes. ANON. *Quarry & Surveyors' & Contractors' Jour.*, 30, 185(1925).—In a recent issue of *Technische Blätter*, there is an article on the quality of porcelain used for elec. insulators.

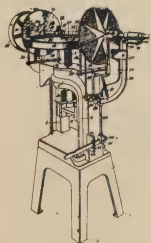
O. P. R. O.

Spark plug. M. WATAYA. *Report Osaka Ind. Research Lab. (Japan)*, 5 [8], 1-30(1924).—German spark plug porcelain (Robert Bosch make) was chemically and microscopically analyzed. W. then prepd. various porcelain bodies using 5 different sources, and compared them with others. The ratio in all mixts. was $MgO:Al_2O_3:SiO_2 = 12.33:0.95:19.58$. The ingredients used were (a) talc, (b) SiO_2 , (c) Korean kaolin, (d) Japanese clay, and (e) a Manchurian rock (the last contg. 16% loss on ignition, 44 SiO_2 , 0.57 Al_2O_3 , 0.91 Fe_2O_3 , 0.25 C, 47.82 MgO). Conclusions: The main constituent of the porcelain of Bosch spark plug must be talc. If the porcelain is made of talc, with limestone as a fluxing agent, the product is not good from every point of view. The porcelain contg. the Manchurian rock as a body possesses the highest insulating power at a high temp. but its resistance to quick temp. change is greatly lowered. The porcelain contg. 80 parts talc. and 0-15 clay is the best and kaolin is much better than plastic clay. The product thus prepd. is superior to the Bosch in insulating power, resistance to extreme changes of temp. as well as to higher voltages. Full data are given.

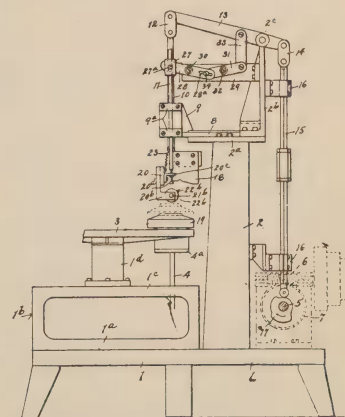
(C. A.)

PATENTS

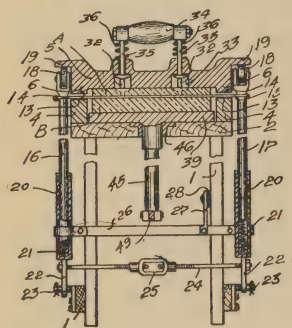
Pottery-forming machine. MARTIN BURGER. U. S. 1,551,728, Sept. 1, 1925. In a pottery-forming mach., a rotatable mold carrying a charge of plastic mat., and a mat. distributing roller engaged and rotated by said rotating charge of mat. whereby the latter is prevented from being thrown off by centrifugal force and is given the desired form.



Tile press. WILLIAM HENRY IVENS. U. S. 1,553,243, Sept. 8, 1925. In a tile press, a screw having a friction wheel on its upper end, a slidable power shaft above the wheel, friction disks on the shaft, a



brake mounted on the shaft to engage said friction wheel, a pivoted lever, a rod connecting the brake with one end of the lever, a pivoted shift arm having one end extending under the free end of the lever, manually operated means for operating the shift arm, a sleeve carried by the power shaft, and a spring-pressed rod in the sleeve and to which the other end of the shift arm is pivoted.



Tile-making machinery. ARTHUR B. FOSSEEN.

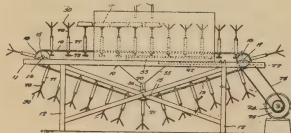
U. S. 1,552,478, Sept. 8, 1925. In a tile-making mach., the combination with a press having lateral guide slots in its walls, of a cutter extending transversely through the press and adapted to reciprocate in said slots, an extensible supporting arm for each end of said cutter and aligned pivots for said arms, and means for swinging said arms to reciprocate the cutter in its slots. In a duplex-tile mach. the combination with means for cutting a rectangular chunk of plastic mat. into wedge-shape tiles, of means for punching the respective tiles to form nail holes.

Method and apparatus for applying slip. RAYMOND

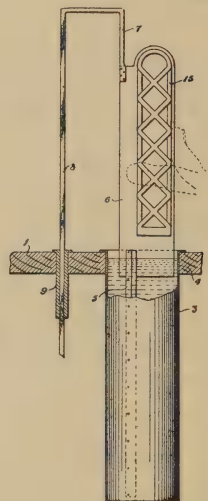
J. GREENE. U. S. 1,552,556, Sept. 8, 1925. The im-

proved method of applying slip to adjoining surfaces of a two-part clay structure, which consists in placing the adjoining surfaces against opposite faces of a "slip" coated blade and sliding the blade from between said surfaces. An app. of the character described, including a tank, a guide rod, a series of lazy tongs connected to the guide rod, a treadle connected to the lazy tongs, a blade connected to the guide rod and extending into the tank, and means for normally holding the treadle in raised position.

Glazing machine. JOHN D. BOWMAN and THEODOR J. ROTH. U. S. 1,553,133, Sept. 8, 1925. A device of the character described comprising a supporting frame, an endless conveyor movable therealong and equipped



with drive means, a plurality of supports carried by the conveyor and adapted to carry articles to be glazed, shields carried by the frame between which the articles pass, means entering between the shields for spraying glazing liquid onto the articles, a hood through which the articles pass subsequent to spraying, and heating means within said hood whereby to effect drying of the articles.



Equipment and Apparatus

Determination of grit in clays. G. M. DARBY. *Chem. Met. Eng.*, 32, 688-90 (1925).—The author made a comparative test of 5 methods. 1. Elutriation (Nobel app.). 2. Flotation (Sutermeister method). 3. Flotation (A. D. Little method). 4. Centrifuging. 5. Wet screening. For grit coarser than 325-mesh, wet screening using satd. 100-, 200-, 325-mesh screens is the best method. Elutriation gave the most accurate results but was too slow for routine testing. The Sutermeister flotation method was promising, being both rapid and accurate. The A. D. Little method did not give consistent results, and the centrifugal method was impractical because of the necessity for varying the speed for different clays. A chart is given for converting particle diam. readings to mesh figures.

M. E. M.

Optical pyrometers. W. E. FORSYTHE. *J. Opt. Soc. Amer.*, **10**, 19-37(1925).—A summary of theory and methods of use of optical pyrometers. D. E. S.

Comparing relative cost of base metal and rare metal thermocouples from actual plant experience. ANON. *Brick & Clay Rec.*, **66** [8], 602-3(1925).—A paving brick manufacturer in decreasing the firing time from 12 days to 6 days found that in "forcing" the kilns in this way, the life of the base metal thermocouple was decreased from 6 fires to less than one. Rare metal couples were installed and the replacements during 4 years of service have been due almost entirely to accidents outside of the kiln. The couples are annealed annually at a cost of \$2.00 each, which constitutes the chief cost of maintenance. In addition, rare metal couples indicate the temp. correctly.

P. D. H.

Optical instruments. F. TWYMAN. *J. Soc. Chem. Ind.*, **44**, 797-8(1925).—The British optical industry, though smaller than the German, is better situated than before the war. Apochromatic objectives are now provided superior to any foreign make. Research on filter-passing micro-organisms demanded an accuracy of focusing and a rigidity not provided by any existing stand, and such a stand, has now been evolved. Improvements in illuminating systems include the combined illuminator used in recent investigations on the cancer virus. British binoculars have a bigger field of view than any other, and camera lenses are also superior. The 41" aperture disk of the largest telescope in the world has been successfully made. The Sci. Instrument Research Assoc. has discovered the origin of differences in transparency of glass. H. H. S.

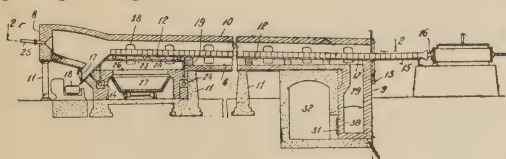
Tyler electric silica still. J. C. OLSEN, W. LINDENTHAL AND I. SHERMAN. *Trans. Am. Inst. Chem. Eng.*, **16** [1], 101-10(1924).—Detailed description of a still designed and constructed by S. L. Tyler, of the Thermal Syndicate, and made entirely of SiO_2 , except for the heating element, which is enclosed in a SiO_2 tube. Tests are given showing utilization of the elec. energy with an efficiency of up to 92%. It may be used to produce distd. H_2SO_4 and other acids of very high purity and of practically any concn. H_2SO_4 may be concd. to over 97%. (C. A.)

A handy, simple photometer for the measurement of low transparencies. ENOCH KARRER AND A. PORITSKY. *Z. tech. Physik*, **6**, 266-8(1925).—2 cuts. (C. A.)

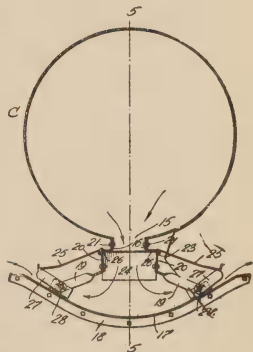
PATENTS

Air conditioning and distributing apparatus. ALFRED E. STACEY, JR. U. S. 1,550,714, Aug. 25, 1925. The combination of an air distributing duct which is open along one side thereof for the discharge of air from the duct, means for delivering air to the duct, a deflector extending lengthwise of the duct opposite said discharge opening and arranged to leave openings between its side edges and the duct for the escape of the air laterally between the deflector and the duct, and means for varying the width of said openings between the duct and deflector to regulate the discharge of the air.

Continuous-heating furnace. WILLIAM HENRY FITCH. U. S. 1,551,945, Sept. 1, 1925. A continuous hgt. fur. comprising a hgt. chamber, a combustion chamber adapted

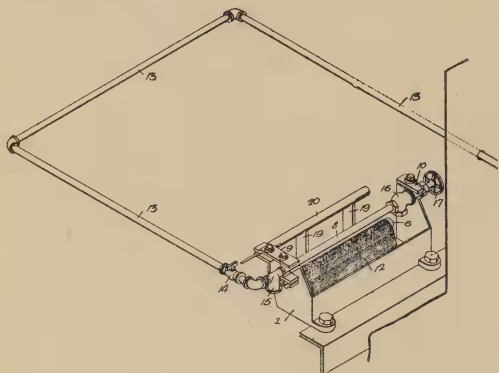


for the burning of pulverized fuel, a track in the hgt. chamber for guiding mat. to be heated, a supporting frame for the track traversing the region of high temp. within the heating chamber to permit the



free circulation of hot gases around the mat. to be heated, said track and frame being composed of hollow members to permit the flow therethrough of a cooling fluid, a chamber below the region of high temp. of the heating chamber for collecting and trapping refuse formed during the combustion of the fuel, said chamber having an easily removable bottom portion, and means permitting the removal of refuse deposited in the heating chamber.

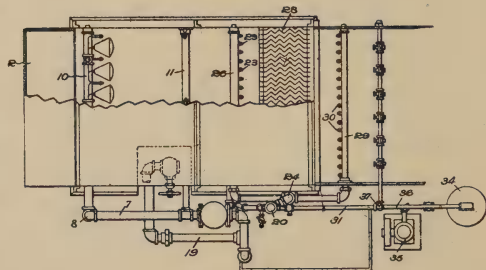
Wet-bulb thermometer. THOMAS H. RHOADS. U. S. 1,553,962, Sept. 15, 1925.



The combination of a box arranged to contain water; a centrally located outlet for the box; a wet bulb thermometer located above the box; a wick extending over the thermometer and into the box on each side of the outlet; a water pipe having an opening through which water is supplied to the wick; and a screen surrounding the outlet of the box and extending upward in the space between the two ends of the wick.

Apparatus for supersaturating air. JAMES JARVIS PREBLE. U. S. 1,554,185, Sept. 15, 1925. An app.

for cleaning, humidifying and supersaturating air and conveying the same to a point of use, comprising in combination an elongated casing having at one end an inlet for the untreated air, a transversely extending series of nozzles within said casing near the air inlet and comprising means for driving, washing and humidifying the air, a second transverse series of nozzles beyond said first series, for scrubbing and further humidifying the air, means for supplying water to both said sets of nozzles, means for collecting, straining and returning to said nozzles the excess water, transversely extending eliminator plates in said casing beyond said second series of nozzles, for removing readily precipitated particles of free moisture from the washed and humidified air, flushing nozzles at opposite sides of said eliminator plates for periodically cleaning the latter, said flushing nozzles being controllable independently of the other nozzles, a plurality of supersaturating nozzles in said casing beyond said eliminator plates in the direction of air flow, and means for supplying water and air under pressure to the same whereby water in extremely comminuted condition is introduced into said air to supersaturate the same, and enclosing means communicating with the casing for conducting the air in such condition to a point of use.

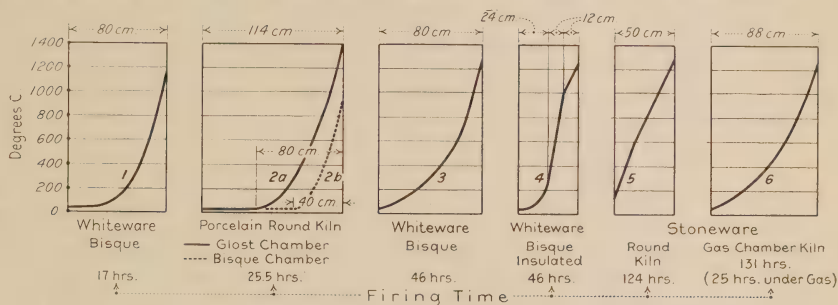


Kilns, Furnaces, Fuels and Combustion

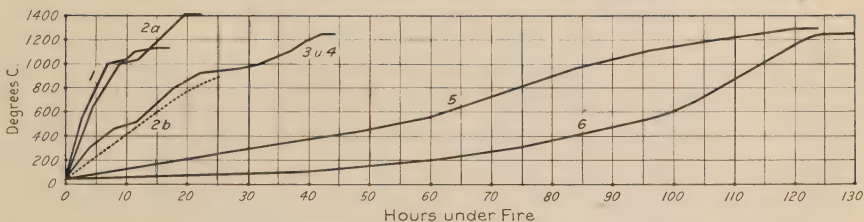
Suction air preheater. E. KLOSE. *Feuerungstechnik*, 13 [15], 183(1925).—Describes a combination of forced draft and preheater app. using products of combustion. Draft, capacity and press. can be regulated to conform with the quantity of fuel used.

F. A. W.

Heat flow in the walls of ceramic kilns. H. WILLMER. *Trans. Ger. Ceram. Soc.*, 6 [2], 49(1925).—Pyrometer readings were taken at different depths in the wall of two round whiteware, one porcelain, one round vitrified tile and one gas-fired chamber kiln. Four nickel-nickel-chromium thermocouples were inserted in holes running into the kiln wall from the door at a height about 6 ft. from the kiln floor, experience having shown that this elevation approximates average conditions between floor and



crown. These holes were 20" deep, slightly staggered and about 6" apart. Temperature readings were also taken of the outside kiln wall and of the fire gases between the kiln wall and first row of saggers. The accompanying curves show results obtained. Calculations based on results obtained showed kiln walls, crown and floor as absorbing 12.8-18.9% of the total heat produced. The gas chamber kiln showed loss through absorption through crown, 2 ends and bottom of 25%. From these tests a formula



was developed governing the penetration of heat into kiln walls: $S = A\sqrt{Z}$ where S = depth of penetration in cm., Z = length of firing period and A a coeff. obtained from the equation $A = S/\sqrt{Z}$. Further formulas are given analyzing the relationship between kiln load and length of burn and heat absorption by walls, etc., per cu. ft. of kiln vol. Tests with insulated kilns showed a reduction of 43% in heat absorbed. Calculations showed a possible saving of 7% fuel on a completely insulated kiln of the type tested.

F. A. W.

Oil firing as applied to ceramics. L. A. MEKLER. *The Ceramist*, 5 [4], 204-16 (1925).—M. stresses the importance of correct firing, compares the properties of oil and coal fires, and points out the changes that should be made in kiln construction and operation when oil is substituted for coal as fuel. Charts illustrating the principles of heat transfer and the performance of a muffle kiln are given.

A. E. R. W.

A rapid fire tunnel kiln for smaller ceramic wares. TAINÉ G. McDOUGAL. *The Ceramist*, 5 [5], 268-71(1925).—A description of 3 small continuous tunnel kilns of an effective and interesting type.

A. E. R. W.

PATENTS

Firing of ceramic masses, especially porcelain, in tunnel kilns with direct gas firing. ALLGEMEINE ELECTRIZITÄT'S GESELLSCHAFT. German Pat. 411,881.—Nozzles

are provided in the air pressure line which soak hot air from the cooling zone and heat so the compressed air is used at the burners. In order to obtain ware free of culls it is necessary that the chem. compn. of the flame is different in the reducing and preheating zone. The invention allows to adjust the compn. of the flame so as to be reducing in the reducing zone, neutral or little reducing in the high fire zone and oxidizing in the preheating zone.

W. S.

Firing of ceramic ware in tunnel kilns. PORCELAIN FACTORY PH. ROSENTHAL AND CO. German Pat. 412,401. The gas which is accumulating in the upper sections of the tunnel is burned by introducing air through thermocouple holes into the zone where the pores of the ware begin to close up. In doing that one avoids blistering the ware near the crown of the kiln.

W. S.

Geology

Antimony in Bolivia. ANON. *Jour. Soc. Chem. Ind.*, **44**, 820(1925).—Bolivia is capable of producing large amts. of Sb, and could more than make good the present shortage. The ores contain a considerable amt. of gold and it is often possible to carry out the production of the two metals simultaneously.

H. H. S.

Cornish china stone. Its value to the ceramic industry. ANON. *Chem. Age*, **12** [305], 14(1925).—Cornish china stone is a type of partially decomposed granite found only in the neighborhood of St. Austell, England. It is employed both in the body and in the glaze of wares. When added to an earthenware or porcelain paste it assists by its fusibility in the vitrification. In glazing mixt. it is one of the less fusible ingredients and acts as a stiffener. Cornish stone vitrifies at about 1200°C.

E. J. T.

Chemistry and Physics

The action of heat on kaolinite and on kaolinitic clays. W. VERNADSKY. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 13(1925).—V. offers a different explanation from Mellor and Scott (*Trans. Ceram. Soc.*, 1924). He thinks that all observed transformations correspond to one and the same process. One mol. of water is replaceable by bases and is lost at 450–460°C with absorption of heat. The other called zeolitic water, disappears on heating proportionately with the temp. and is in solid soln. in the crystalline space lattices. During this dehydration kaolinite is changed to anhydrous leverrierite, $\text{Al}_2\text{Si}_2\text{O}_7$ which is stable up to 1000°C. Many reasons are advanced to support the presence of this compd. Above 1000°C leverrierite decomposes to cristobalite and mullite or keramite. V. claims to have suggested the presence of some such compd. in 1891. Structural formulas of these compds. are proposed.

F. G. J.

X-ray investigations of clays and some other ceramic substances. ASSAR HADDING. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 27(1925).—X-radiographic anal. is of two different kinds, either "molecule" anal. or "atom" anal. "Atom" anal. corresponds to chemical anal. but can never quite substitute it. "Molecule" analysis is like optical investigation but is effective on micro- and crypto-crystalline subs. In mol. anal. the prepn. is irradiated with X-rays of known wave-length. The crystalline particles then produce secondary X-rays which give characteristic diagrams. These diagrams are interpreted by comparing with those of typical substances. Complicated diagrams may be simple to interpret.

F. G. J.

The influence of exposure on the chemical and physical properties of certain fire-clays. W. HUGILL AND W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 42(1925).—Three samples were studied. They were broken into pieces 2" in diameter and spread evenly over the bottom of wooden boxes covered with fine muslin and exposed for a year. Meteorological conditions are recorded. Comparative chem. analyses of samples

before and after exposure show a loss of sol. salts and an increase of refractoriness. The rate of settling was not much altered. Bricks were made, fired, and tested and microstructures photographed. Exposure improved siliceous clays more than an aluminous one.

F. G. J.

A rapid method for the determination of true (or powder) specific gravity. W. HUGILL AND W. J. REES. *Trans. Ceram. Soc. (Eng.)*, **24** [1], 70(1925).—The app. consists of a flask of 250-cc. capacity with graduation for this amt. Above the mark is a bulb, then a long neck graduated in specific gravities from 2.00 to 2.70. Liquid is added to the lower mark, then 100 gms. of powder is poured in and the gravity read direct. Organic liquids may be used to reduce soly., surface tension and viscosity.

F. G. J.

Notes on rational analyses of clays and kaolins. ANON. *Keramos*, **4** [7], 353 (1925).

F. G. J.

A test of relative decolorizing efficiencies of clays. J. B. HILL, L. W. NICHOLS AND H. C. COWLES. *Ind. Eng. Chem.*, **17** [8], 818(1925).—A test was needed for the proper control of kiln revivifying spent fullers' earth or clay from the filtration of heavy petroleum oils. Such a test was devised and is described.

F. G. J.

The sixth international conference of pure and applied chemistry. J. C. DRUMMOND. *Jour. Soc. Chem. Ind.*, **44**, 811-2(1925).—The conference met this year from June 22 to 25 in Bucharest, Roumania. Discussions were held on the nitrogen problem, autoxidation and catalytic phenomena, and the relation between chem. constitution and physiological activity. Excursions included one to Medias, Transylvania, where large factories for enameled iron, sheet glass and bottles are run by natural methane of compn. 99% CH₄ and calorif. value 8500 cal. per cu. m. An invitation by the Americans to hold the Seventh Conference in Washington next year was accepted.

H. H. S.

Effect of light on kaolin suspensions. C. G. T. MORISON. *Proc. Roy. Soc.*, **108A**, 280-4(1925); *Jour. Soc. Chem. Ind.*, **44B**, 617(1925).—During expts. on the application of the Goldberg wedge to an optical method of detg. the size distribution of particles in soils, it was observed that the passage of a beam of light caused soil and kaolin suspensions to become stratified, the layers running parallel to the surface of the suspensions. The distance between successive strata varies with the wave-length of the light. On cutting off the light, the stratification slowly disappears.

H. H. S.

Calculation of products of combustion. W. GUMZ. *Feuerungstechnik*, **13**[16], 195 (1925).—In flue gas analysis it is customary to consider all C as changed to CO₂ and CO. This does not take into acct. C left in ash and carried away in solid form as soot or smoke. Using formula devised by A. B. Helbig, tests on a certain Ruhr coal show a direct loss of C in solid form as high as 9%.

F. A. W.

General

Alumina from china clay. What experiments reveal. ANON. *Chem. Age*, **13** [318], 11(1925).—The method proposes to prepare alkaline aluminate by fusing clay lime and scrap iron with a reducing agent in the elec. fur., thereby reducing the silica and forming calcium aluminate and ferrosilicon. The calcium aluminate being lighter will flow to the top substantially free from foreign oxides. It could then be tapped off, cooled and later crushed and leached with sodium carbonate soln. to form by double decompn. sodium aluminate and calcium carbonate. The former is sol. and yields readily aluminum by hydroxide. The ferrosilicon would be recovered as such and sold at a profit. The reactions are thought to be as follows:

1. $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O} + \text{Fe} + 4\text{C} + \text{CaO} = \text{FeSi}_2 + 4\text{CO} + \text{CaO} \cdot \text{Al}_2\text{O}_3 + 2\text{H}_2\text{O}$
2. $\text{CaO} \cdot \text{Al}_2\text{O}_3 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 + \text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3$

The cost of the production of alumina by the method would be more than \$300.00 per ton. There was no proof that calcium aluminate was formed, because, with so much carbide present, it was just as likely that the sodium aluminate obtained was formed by the decompn. of aluminum carbide and its soln. in the sodium carbonate.

E. J. T.

New method for determination of the expansion in high temperature. HANS HIRSCH AND MAX PULFRICH. *Tonind. Zeit.*, **49**, 452-3(1925).—Description of the process which is carried on with a precision cathetometer designed by the authors.

W. S.

Tables Annuelles de Constants et Données Numériques. 4 [1] (1913, 1914, 1915, 1916).—1. Elasticity, (a) Young's modulus (Fe, Al, Cu, glass, quartz, etc.), (b) Elastic limit (Fe electrolytic, glass), (c) Quartz threads. 2. Viscosity, (a) Blast furnace slags, (b) Viscosity of glasses. 3. Coefficients of Expansion, (a) Linear expansion—quartz, silicates, glasses, porcelain, enamels. 4. Specific Heats, (a) Brick, (b) Latent heat for molten quartz and of various metals. 5. Thermal Conductivity, (a) Glass. 6. Melting Points, (a) Inorganic compounds (list of systems studied), (b) Inorganic compounds-organic compounds (list of systems studied), (c) Ternary mixtures—elements and inorganic compounds (list of systems studied). 7. Intra-Red Spectral Region, (a) Coefficient of transmission of red glass (Jena). 8. Coefficients of Absorption, (a) Transparency of glasses and color filters. 9. Refraction and Dispersion, (a) Optical glasses. **Tables Annuelles de Constantes et Données Numériques. 4** [2] (1913, 1914, 1915, 1916).—10. Electric Conductivity, (a) Various substances (Al, paraffin, S, resin, wax, glass, etc.), (b) Spar, quartz, glass, rock crystal, (c) Quartz, (d) Electric dilation of solid insulators under the influence of an electrostatic field. 11. Magnetic Susceptibility, (a) Various substances (quartz, hydrates, etc.). 12. Magnetic Rotation, (a) Quartz, (b) Graphite. 13. Diffusion, (a) In solids—Ag ions in soda glass. 14. Calorimetry and Thermo-Chemistry, (a) Heat of adsorption, of transition, (b) Total heat of formation. 15. Crystallography and Mineralogy, (a) Melting points of minerals, (b) Transition temperatures. 16. Engineering, (a) Mechanical constants—building materials: (1) Influence of size of sand on the strength of mortar, (2) Strength of various cements, (3) Influence of various addition in the water of mortar, (4) Trass mortar, (5) Various materials: Magnesia and alumina, strength of plaster, glass, porcelain, road materials, brick walls, coke, (b) Electrical constants: (1) Technical properties of porcelains for insulation, (c) Refractory materials: (1) Melting points of fire brick, (2) Shrinkage of "Veritas" firing rings, (3) Thermal conductivity of refractory materials, (4) Softening points and analysis of refractory materials, (5) Melting points of slags, (6) Shrinkage at high temperatures of zirconium dioxide crucibles, (7) Formation temps. of constituents of Port. cement during the burning of the clinker composed only of Ca_2O , Al_2O_3 , SiO_2 , (d) Refractory materials: (1) Specific heat, (2) Thermal condy., (e) Melting points: (1) Various materials—silicates, phosphates, sulphides, (2) Refractory brick, (3) Slags, (f) Refractive indices: (1) Colloidal silica and natural glasses, (2) Liquid crystals and mixtures of liquid crystals, (3) Essential oils (variation with temperature), (4) Oils for steam turbines, (5) Fluids of the body. **Tables Annuelles de Constantes et Données Numériques. 5** [1] (1917, 1918, 1919, 1920, 1921, 1922).—1. Elasticity and Compressibility, (a) Quartz, glasses. 2. Coefficients of Expansion, (a) Quartz, silica, glasses, (b) Coefficient of linear dilation of glasses for laboratory materials. 3. Viscosity of Quartz. 4. Surface Tension, (a) Glass. 5. Specific Heats, (a) Pyrex glass, silica, and silicates, various minerals. 6. Thermal Conductivity, (a) Quartz, glass, etc., (b) Brick. 7. Melting Points, (a) Inorganic compounds (list of systems studied). 8. Coefficients of Absorption or of Extinction, (a) Influence of temperature on the transmission of light through colored glasses,

(b) Transparency of colored glasses used in the Hess-Ives photometer. 9. Indices of Refraction Dispersion, (a) Optic glasses, (b) Primary etalons in quartz, (c) Glass for use in the laboratory, (d) Crystals and glasses of disilicate of Ba included in Ba-crowns, (e) Annealing, birefringence and tension of glasses, (f) Double refraction in melted silica, (g) Refraction indices of the striae in optical glasses, (h) Refraction, dispersion and composition of optical glasses, (i) Binary glasses. 10. Electricity, (a) Glasses, (b) Silica, insulators, (c) Variation of conductivity with high frequency and with the dielectric constant: (1) Glass.

The properties of clays. A. V. BLEININGER. *2nd Colloid Symposium Monograph*, 1925, pp. 80-98.—The properties of clays are considered under the following heads: aggregate structure, mineral composition and micro-structure, fineness of grain, chem. compn., clay suspensions, plastic state, dry state, effect of heat, fired state, testing.

(C. A.)

Plasticity in colloid control. E. C. BINGHAM. *2nd Colloid Symposium Monograph*, 1925, pp. 106-13.—B. stresses the importance of plasticity along the lines brought out in his book "Fluidity and Plasticity." By using long capillary tubes and properly evaluating seepage and slippage, the formula $V = \mu(F-f)r$ will probably be found to hold over a wide range of shearing stresses. Here μ is the mobility (the reciprocal of the consistency), F the shearing stress in dynes per sq. cm., and r the distance between the two shearing planes. "Notwithstanding that clear and indubitable evidence has now been found that in suspensions the flow is a linear function of the shearing stress, and the yield value obtained is quite independent of the dimensions of the instrument, nevertheless in colloids of the emulsoid type, evidence is found for exactly the opposite conclusions. The flow of emulsoids through a long capillary is not a linear function of the shearing stress, and the yield value cannot be obtained by simply extrapolating the flow-stress curve, for with capillaries of different radii non-concordant values for the yield value would be obtained." This evidence (to be published later) was obtained by Hood, Arnold and B. To explain the sharp distinction between the two types of colloids, it must be recalled that internal friction is due to two causes: (1) *diffusional viscosity*, resulting from interdiffusion of molecules having different amts. of transitional energy, (2) *collisional viscosity*, caused by actual spacial interference as the layers are sheared over each other. In liquids far removed from the crit. temp. (1) is of small importance, and the viscosity due to (2) follows Batschinski's law that fluidity is proportional to free vol. Chem. combination consequent on heat or pressure may qualify the law, which applies to suspensions as well. In suspensions a third cause of internal friction is the rotation of particles in the shearing process, energy being continually absorbed from the external stress in breaking down transient "structures." Hence flocculation increases yield value. Work is being continued on the structure effects in emulsoids. In many cases "m. p." is without scientific value.

(C. A.)

Some applications of thermels in the measuring technic of large-scale chemical industry. P. GMELIN. *Ann. Physik*, 76, 198-224 (1925).—(1) *O as impurity is measured* in H and in N almost instantaneously as the gas streams by, by using a catalyst and furnace (350° or so) in a side stream. The heat produced is measured by a thermel of from 8 to 24 couples, and a sensitive voltmeter. *Constant speed* of the gas, a very important factor, is secured by a series of constrictions, alternating with outlet tubes dipping in liquid, constituting overflow pressure regulators. Failure of the stream, or excessive impurity, rings an alarm. In one case the app. indicated 0.1 per mille of O within a minute, and rang the alarm at 0.5 per mille. (2) *Variations in the composition of producer gas* are continuously measured by a calorimeter which consists of a flame radiating to a thermopile. Marquardt capillaries increase and make more uniform the radiating power of the flame. The lag is about 20".

(C. A.)

Lead borates. E. C. BROWN AND J. R. PARTINGTON. *Jour. Soc. Chem. Ind.*, **44**, 325-6T(1925).—Methods used by earlier workers to prep. Pb borates by fusion and pptn. were tried out, but no positive evidence was obtained for the existence of a simple borate of Pb. The (1) occlusion of $\text{Pb}(\text{NO}_3)_2$ by the ppt., and (2) the effect of washing, are important factors. Such borates of Pb as have been described are really basic substances whose compn. depends upon the method of prepn. (C. A.)

Chemical constitution of brick clay. A. DEMOLON. *Compt. rend.*, **180**, 1518-20 (1925).—Quartz and combined SiO_2 , Al_2O_3 , free and combined Fe_2O_3 , MgO , K_2O , combined H_2O , and p_{H} are tabulated for the clay and the 5 fractions into which it was sepd. by levigation. The results indicate an isomorphous mixt. of aluminosilicates and ferri-silicates. Identification of glauconite in the sand fractions indicates it as the source of the ferri-silicates, of the K_2O other than that from mica, and of the free Fe_2O_3 . The deposit contains no appreciable amt. of S compds., though the tertiary deposits from which it originates contain numerous pyritic elements. There is 0.4-0.7% total P_2O_5 and no free Al_2O_3 . (C. A.)

An artificial magnésium silicate. A. DAMIENS. *Compt. rend.*, **180**, 1843-5(1925).—When a soln. of Na silicate is pptd. with MgSO_4 , no definite compd. is obtained, and part of the Mg Na silicate stays in colloidal soln. In fractionating the deposit, it yields silicates from $2\text{SiO}_2(\text{MgNa}_2)\text{O}$ to $\text{SiO}_2(\text{MgNa}_2)\text{O}$. (C. A.)

The labradorization of the feldspars. O. B. BØGGILD. *Det. Kgl. Danske Videnskabernes Selskab, Math-fys. Medd.*, **6** [3], 3-79(1924).—Labradorization is the reflection of light from submicroscopic planes, which usually have but one orientation for a given specimen. The planes never have a position capable of expression by simple indices. Aventurization is entirely different (cf. Andersen, C. A. **9**, 3192). B. examd. 53 specimens of feldspars showing this phenomenon. Only certain varieties have labradorization: *orthoclase* contg. Or_6Ab_1 to Or_1Ab_2 ; *albite-oligoclase* with 8-14% *An*; and *labradorite* with 38-49% *Ab*. In orthoclase the labradorization is caused by intergrown lamellae of albite, at 72-75° to (001) in the zone of the orthodomies. In the plagioclases there are 4 different orientations of the planes of labradorization, but the effect is generally visible through (010). In the plagioclases the cause is unknown. (C. A.)

Some artificial mineral compounds. P. J. HOLMQUIST. *Geol. För. Förh.*, **47**, 142-4(1925).—Quartz brick in a Martin furnace undergo changes in chem. compn. at high temp. Noticeable amts. of Fe are taken up. About 2% of the Ca content is lost. Under the slag are found small, dull yellow, rhombodecahedral crystals of *melanite*. Tridymite, cristobalite, magnetite and an undetd. slag silicate rich in Fe were also found. A deposit of *magnetite* in a Platen-Munter cooler (using NH_3 and H_2O at 10 atm. and 140°) was investigated. In the 6-mm. Fe tube, where the NH_3 was most rapidly evolved from the liquid, octahedral crystals of magnetite were found. Where the NH_3 was evolved more slowly the crystals were smaller. A soot-like powder of magnetite was found throughout the whole interior. The magnetite is carried as such in the NH_3 soln., from which it separates by direct crystn. Fe ore briquets were subjected to elec. arc flame. The easily flowing melt on cooling crystd. as magnetite, coated by oxidation in air with a thin layer of hematite which at high temp. formed a twinned laminated variety. Two forms of crystd. Fe_2O_3 exist—a high temp. (β -) and a low temp. (α -) form. (C. A.)

Economic utilization of waste heat for generating steam. F. WINTERMEYER. *Feuerungstechnik*, **13** [14], 169(1925).—Discusses the tremendous economic saving possible and construction of suitable types of boilers. F. A. W.

Coke from lignite. HUDLER. *Feuerungstechnik*, **13** [17], 208(1925).—Describes method of extracting tar and coking lignite. Increased gas content gives only 1% higher heat value but reduction of moisture content increases efficiency. F. A. W.

Thermotechnical application of Schoop process. E. BELANI. *Feuerungstechnik*, 13 [19], 232(1925).—This process involves the spraying of objects with metal dust by means of a special gun which feeds the metal in wire form through an oxy-hydrogen flame and a comp. air nozzle at $2\frac{1}{2}$ atmos. Thickness of coating up to $\frac{3}{8}$ ". Prepn. of surface with sand blast recommended. Expts. with grate bars heated to high temp. and coated with aluminum showed remarkable results, increasing their life 600% over similar bars uncoated. Further advantages are the lessened adherence of clinkers and consequent blocking of the openings and low cost of application. Treatment applicable to any metal parts subject to high temp., i. e., boiler linings and tubes, retorts, stills, etc.

F. A. W.

Individual or group drive. ROBERT W. DRAKE. *Brick & Clay Rec.*, 66 [8], 594-7 (1925).—This article has been reprinted from *Industry Illustrated*, issue of Sept., 1924. In general, there is a field where each type of drive is supreme and it is folly to attempt to apply the other. There is a large middle ground where either may be used and where each case must be decided upon its merits. This article offers a number of suggestions to aid in such a decision.

P. D. H.

Is the Diesel engine good equipment? R. H. BACON. *Brick & Clay Rec.*, 66 [8], 598-600(1925).—This is an educational article describing the operation of the Diesel engine and pointing out why it is dependable, economical and desirable power.

P. D. H.

Industrial chimneys. ANON. *Contract Rec and Eng. Rev.*, 39, 542(1925).—A discussion of the construction of all types of indus. chimneys. Highest concrete stack on the continent is in British Columbia. Radial brick chimneys are built with special blocks formed to suit the circular and radial lines of each section of the chimney and molded with vertical perforations. There are several advantages in these: perforations permit a more thorough firing of the blocks in the kiln, and produce a more homogeneous block than could be obtained were they solid, and their strength and density are thus materially increased. On account of their radial form tight joints are obtained, this, with air space due to perforations, gives max. conservation of heat inside chimney. On account of the high refrac. powers of the blocks, long protective linings may be eliminated.

O. P. R. O.

Silicate of soda in road construction. ANON. *Roads and Road Construction*, 3, 229(1925).—Results obtained by the use of silicate of soda on roads in Switzerland are given by M. Guelle in the Feb. 21 issue of *Gen. Civil*, 1925. Guelle estimates that the use of silicate of soda saves at least 30% or more, under some conditions. (1) The silicated roads, with regular use, have for vehicles a very smooth surface. (2) As compared with ordinary roads with an average traffic, a saving may be effected which according to the district may vary from 30% to 80%. (3) Thaws have no influence on them.

O. P. R. O.

Blue asbestos. ANON. *Jour. Soc. Chem. Ind.*, 44, 796(1925).—Ordinary white asbestos (chrysotile) found in many parts of the world, is essentially a hydrated Mg silicate. Blue asbestos, or crocidolite, which occurs only in S. Africa, contains a considerable amt. of iron, and is a ferrous magnesium silicate with less moisture content, and of a deep lavender blue in color. It possesses many advantages over the white variety, the fibers being longer, $\frac{3}{4}$ to 2", with considerably higher tensile strength, while it has a lower sp. gr. and is very much more resistant to high temps. It is thus not only good for covering steam boilers and pipes, but, being entirely unaffected by acids and alkalis, finds extensive application in chem. industry for packing rings, filter cloth, etc., and in marine work for segments, ropes and mattresses. Tests by the Nat. Phys. Lab. show that as a non-conductor of heat it is 20% better than white asbestos. It saved 94% of the loss from a bare steam-pipe at 300 lb. press., and it appears to last indefinitely, installations having been in opern. for 15 years at 425°C.

H. H. S.

Fuel economy. HENRY WILLIAM SELDON. *The Ceramist*, 5 [2], 105-17(1924).—S. stresses the importance of fuel economy to plant executives, emphasizing the practical side. S. relates steel and glass plant experiences to show the importance of coöperation and instruction of operators in attaining fuel economy. S. gives a summary of good operating instructions under the following headings: (1) competent operators are invaluable, (2) requirements must be standardized, (3) coöperation is necessary, (4) supervision must be constant, (5) standards of practice should be established and checked. The use but not utter dependence on pyrometers, draft gages and other efficiency instruments is urged. Factors influencing the efficiency of the actual combustion such as (1) air supply, (2) size and aeration of flame, (3) chem. compn. of gas burnt, (4) difference in temp. and intimacy of contact between gas and bath, (5) velocity of gases, (6) speed of firing are discussed. The characteristics of the different fuels and types of gas producers available and their relation to fuel economy is taken up in detail. The advantages of mechanical producers and automatic combustion regulating devices are given.

A. E. R. W.

Ancient earthenware. ANON. *The Ceramist*, 5 [4], 222-34(1925).—Pictures and descriptions of pit houses and earthenware found in the prehistoric habitations of Chaco Canyon, New Mexico.

A. E. R. W.

The state trade school for the glass industry in Zweisel. BRUNO MAUDER. *Keramos*, 4 [7], 349(1925).—A long article descriptive of the courses taught. One of a series of such articles.

F. G. J.

Progress of ceramics and its importance for the chemical industry. F. SINGER. *Keramos*, 4 [7], 359(1925).—The chem. industry depends on ceramics for (1) the development of the mechanical resist. of ceramic wares; (2) the development of chem. resistance, especially resist. to bases; (3) development of refracs.; (4) development of resist. to temp. change; (5) development of the density or porosity of mats; (6) construction of special mats. for special purposes.

F. G. J.

Utilization of waste heat from tamps. BJARNE SCHIELDROP. *The Glass Worker*, 44 [47], 15(1925).—Waste heat has been used for boilers at open hearth steel furn. for 15 years and recovers up to 30%. This has been little used on glass tanks. The necessary conditions are considered.

F. G. J.

BOOK REVIEW

Pueblo Pottery Making. A study at the village of San Ildefonso. CARL E. GUTHE. Introduction by A. V. KIDDER. Published for the Department of Archaeology, Phillips Academy, Andover, Mass., by the Yale University Press, 1925. 8 x 11". 88 pages, 35 plates, 11 figures. Price \$4.00.

Dr. Kidder in the introduction very clearly compares conditions in Southwestern America with those in Egypt and shows how native pottery supplies the key for the chronological sequence of changes of culture. A study of the ancient fragments is well supplemented by investigating modern methods. The modern Indians are little different from their remote ancestors of before the conquest. Lately they had degenerated in pottery making until the Museum of New Mexico and the School of American Research stimulated a revival of the industry. Certain of the Indian women have made real progress both technically and artistically. Maria Martinez, whose picture forms the frontispiece of the book, seems to have been the most successful. The incomes made by these women have built up the community.

A very intimate story is detailed of the entire process of Pueblo pottery making. The reader is taken to the sources of raw materials, introduced to the tools, and carried painstakingly through every stage of the process. Frequent footnotes compare similar

details given by Stevenson in an account of Zuni pottery making. Tables are given of the minutes and seconds required for each series of operations. The occasional suggestion of other household activities of the potter relieves the monotony for both reader and worker. While scientific details are absent, no mechanical step is slighted in the description. All ware is made by the single fire process. Slipping, polishing and decorating are done on the sun-dried pieces. Designs are absolutely free-hand, without pattern.

The firing is perhaps the most casual process of all. Pots are set on any kind of a grate and built over with slabs of dried dung. Cedar wood kindlings are burnt below. In twenty to thirty minutes the oven is broken up and the pots pulled out. Another lot is set at once. Four firings are often made in one morning, the last being a reducing fire to give black ware. Throughout the book frequent photographs are reproduced showing the details of each step in the process of manufacture.

The book is an excellent story of domestic pottery and should be of interest to all who love form and design and who long to potter around with clay.

F. G. JACKSON

Meetings of the Society

This SOCIETY functions in part by meetings at which papers are read and topics discussed. One such meeting was held in New York, October 1, to discuss whether product and product requirements should be stressed more in school curricula. Eight papers were read and a lively discussion had. At one time there were 120 persons in the hall and several other members reported as present.

In the evening we had a delightful banquet at the Hotel Roosevelt with Dr. Herty, Senator Wadsworth and Editor Abbot as speakers. Edwin M. Rupp of Continuous Tunnel Kiln Corporation of America was the local representative making arrangements.

Now for the big Annual Meeting to be held in Atlanta, February 8-13. From what the Division officers report we are to have a great meeting, one that will profit all who attend.

CERAMIC ABSTRACTS

Compiled by the

AMERICAN CERAMIC SOCIETY

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¹ The abbreviation (C. A.) at the end of an abstract indicates that the abstract was secured from *Chemical Abstracts* by cooperative agreement.

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Abrasives

Loose abrasives standardized. HENRY R. POWER. *Abrasive Ind.*, 6 [9], 275 (1925).—P. points out the great need for the standardization of loose abrasives as adopted by the Grinding Wheel Mfrs. Assn. of the U. S. and Can. A table is given showing the dimensions and tolerances of U. S. standard sieves. C. J. H.

PATENTS

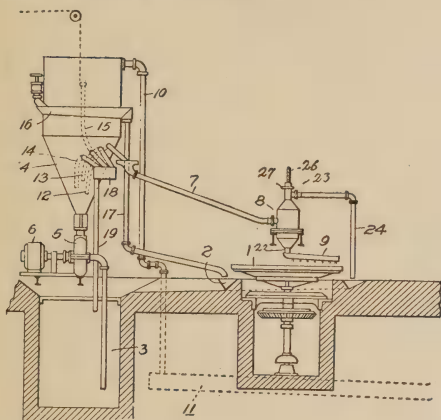


Grinding-wheel bearing disk. ALBERT M. LEVERICH. U. S. 1,554,861, Sept. 22, 1925. The combination with a grinding wheel, of a bearing flange having recesses in its inner face, said recesses having their bottoms inclined outwardly and gripping members movably mounted in said recesses.

Article of silicate bonded granules. CLARENCE B. TILTON and MILTON F. BEECHER. U. S. 1,555,086, Sept. 29, 1925. The method of making an article of bonded abrasive grains comprising the steps of mixing said grains with dry sodium silicate and a temporary viscous binder and thereafter heat treating a formed mass of said ingredients at a temp. between 850°C and 1000°C, to fuse the bond into intimate contact with said granules.

Silicate bonded abrasive articles and process of making the same. PEHR JOHANSON and CLARENCE B. TILTON. U. S. 1,555,119, Sept. 29, 1925. A bonded article of granular mat. and a bond comprising dry sodium silicate and liquid sodium silicate set by the application of heat without fusion thereof, said silicate content forming more than 10% by weight of the total mass.

Method and apparatus for making ceramic products. EDWARD ANDERSON. U. S. 1,556,193, Oct. 6, 1925. The method of making a ceramic article, which comprises puddling the constituents of the article, adding a quantity of temporary binding mat., enclosing the puddle in a mold and depositing the mold in an oven, the temp. thereof being then raised to a point sufficiently high to cause the binding material to bind the constituents of the puddle together, and maintained thus until the puddle is dry, the puddle being subjected indirectly to air currents in the oven.



Process and apparatus for applying abrasive to grinding apparatus. CHRISTOPHER BROWN. U. S. 1,556,753. Oct. 13, 1925. The process of applying abrasive to a grinding mach. which consists in collecting the abrasive and water from the mach., returning the mixture to a grader and separating the abrasive into a series of grades, withdrawing therefrom first the coarsest grade of abrasive mixed with water, flowing it to the grinding mach., and eliminating a portion of the water in such withdrawn mixture as it flows from the grader to the mach.

Bauxite. A. M. McAFEE. Can. 247,771, Mar. 17, 1925. Bauxite is dehydrated and heated by contact with products of combustion under conditions precluding shrinkage and C is catalytically deposited in its pores by exposure to hydrocarbon gases. (C. A.)

Art

Decalcomania. I. BERTRAND RHEAD. *Ceram. Ind.*, 5 [2], 149(1925).—History, development, uses and future possibilities—domestic, English and continental practice. *Ibid.*, II; *Ceram. Ind.*, 5 [3], 250(1925).—A number of directions are given to obtain best results. F. G. J.

Technical classes in pottery and glass. ANON. *Pottery Gaz. and Glass Trades Rev.*, 50 [579], 1414(1925).—Gives particulars compiled from the prospectuses of schools, etc., as received. The following schools are described: Central School of Science and Technology, Stoke-on-Trent; Cumberwell School of Arts and Crafts, Peckham Road, London; City and Guilds of London Institute, Kensington Park Road, London; London County Council Central School of Arts and Crafts, Southampton Row, London, W. C.; The Woolwich Polytechnic School of Arts and Crafts; Municipal College School of Art, Renfrew St., Glasgow; The University of Sheffield, Dept. of Art Technology, Wordsley Art and Technical Institute, Wordsley, Stourbridge, Staffs. (To be continued.)

F. G. J.

PATENTS

Coating porcelain or glass with metals. A. F. EIJSEN. Brit. 229,263, Feb. 15, 1924. Porcelain or glass is coated with brass by rubbing the dulled surface with a small quantity of glycerol by use of a brass brush. Cu may be deposited electrolytically. AgNO₃ may be added to glycerol to produce Ag deposits. (C. A.)

Cement, Lime and Plaster

Standard specifications for gypsum plastering sand. A. S. T. M., *Yearbook*, 1925, Serial designation: C 35-25, 25.—Specifications are made as to compn. and as to grading. These specifications were proposed as tentative in 1921 and adopted in amended form in 1925. R. M. K.

Standard methods of making compression tests of concrete. A. S. T. M., *Yearbook*, 1925, Serial designation: C 39-25, 37-42.—These methods are discussed under the following items: scope, preparation of materials, sampling for preliminary tests, cement tests, fine aggregate tests, coarse aggregate tests, mixed aggregate tests, proportioning, size of test pieces, mixing concrete, workability, forms, molding test pieces, capping cylinders, curing test pieces, age at test, sequence of tests, method of testing, application of load, record of tests, weight of concrete, density and yield, report of tests. R. M. K.

Standard specifications for gypsum partition tile block. A. S. T. M., *Yearbook*, 1925, Serial designation: C 52-25, 32-34.—Specifications are discussed under the following headings: uses, composition, form and size, core spaces, dimensions, strength, absorption, fire resistance, sampling, marking, inspection, rejection and reheating. Under "Method of Testing" the following tests are described: compressive strength of gypsum partition tile or block, transverse strength of gypsum partition tile or block, and absorption for gypsum partition tile or block. R. M. K.

Standard specifications for gypsum plaster board. A. S. T. M., *Yearbook*, 1925, Serial designation: C 37-25, 29-31.—Specifications are made under the following captions: compn., thickness, dimensions, weight, strength, finish, sampling, packing and marking, inspection, rejection and method of testing. R. M. K.

Standard specifications for gypsum wall board. A. S. T. M., *Yearbook*, 1925, Serial designation: C 36-25, 26-28.—Specifications are made for the following items: compn., thickness, dimensions, weight, strength, finish, sampling, packing and marking, inspection, rejection and methods of testing. R. M. K.

Standard specifications for gypsum. A. S. T. M., *Yearbook*, 1925, Serial designation: C 22-25, 22-24.—The tests are classified under the following divisions: (1) materials and standards, (2) sampling, (3) packing and marking, (4) inspection and rejection. These specifications were proposed as tentative in 1919 and adopted in amended form 1925. R. M. K.

Standard specifications for quicklime and hydrated lime for use in the cooking of rags for the manufacture of paper. A. S. T. M., *Yearbook*, 1925, Serial designation: C 45-25, 20-21.—The specifications are given in three divisions: (1) requirements, (2) methods of test, (3) sampling, inspection and rejection. R. M. K.

Factors affecting the time of set of mechanically-mixed gypsum mortars. L. E. SMITH. *Rock Products*, 28 [17], 61(1925).—The time of stirring of retarded gypsum mortars has no appreciable effect on their time of set. The addition of set gypsum accelerates the time of set of retarded gypsum mortars, the relative rate of set being approx. directly proportional to the amt. of set of gypsum added. (C. A.)

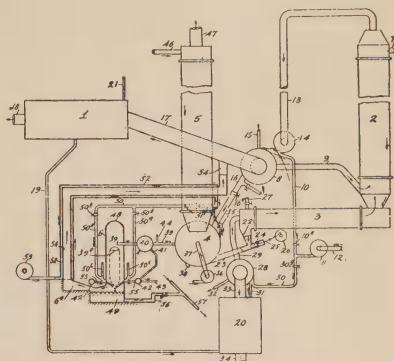
PATENTS

Process of making cement. EDWIN C. ECKEL. U. S. 1,555,405, Sept. 29, 1925. The process of making cement containing a titanium constituent, comprising the addition to a cement mixture, during or before fusion or clinkering, of a suitable proportion of an artificial titanic compound.

Process for the use of mixtures of aluminous cements with ordinary cements. SPERANZA SÉAILLES, NÉE CALOGÉROPOULOS AND JEAN SÉAILLES. U. S. 1,556,038, Oct. 6, 1925. A process for the use of aluminous cements in connection or in mixture with the ordinary hydraulic cements, which consists in placing in position a layer of aluminous cement and immediately afterward a layer of ordinary cement.

Process of making cement clinker.

CHARLES B. HILLHOUSE. U. S. 1,555,283, Sept. 29, 1925. The process of making cement clinker with an iron or steel by-product, which consists in adding lime to iron sponge in less quantity than that required for clinker, fusing the sponge and lime to a liquid state in a fusion fur. at a temp. substantially lower than that for clinkering, with drawing the resulting liquid slag from the fur., raising its temp. to that required for clinkering, and adding thereto, in a suitable chamber and at a clinkering temp., the lime necessary for cement clinker.

**Dental filling material.** PAUL W. KRUGER. U. S. 1,556,696, Oct. 13, 1925.

A dental cement compn. consisting of a cement powder and a liquid in which guaiacol is the setting agent having setting reaction with said powder in forming a hardened mass. A dental cement comprising a powder suitable for dental uses, which comprises kaolin and magnesium oxide, and a liquid in which guaiacol is a setting agent that reacts with the powder to harden with it.

Hardening lime mortar or plaster. A. A. ALLES. U. S. 1,547,713, July 28, 1925.

An intimate mixt. of finely divided coke and CaCl_2 is used as an addn. to lime.

(C. A.)

Moldable oxychloride composition. J. A. RITCHIE. Brit. 229,092, Feb. 15, 1924.

Mg oxide and chloride are used with fibrous material such as sawdust which is moistened before admixt. with the other ingredients. Powd. quartz, coke breeze and similar ingredients may also be added and Na silicate serves to facilitate obtainment of a smooth surface when the compn. is molded.

(C. A.)

Dental cements. P. W. KRUGER. U. S. 1,548,616, Aug. 4, 1925.

Deterioration of dental cement constituents, e. g., those of oxychloride cements, is prevented by preserving them in admixture with volatile substances such as acetone, benzine or AmOH which are evapd. before the cement is used.

(C. A.)

Enamel

Preliminary report of an investigation of the molding sand resources of Illinois.

M. S. LITTLEFIELD. Ill. State Geol. Surv., *Rept. of Invest.*, 3(1925).—A 37-page report.

F. G. J.

Flotation of enamels. ANON. Bur. Stand., *News Bull.*, 101, Sept., 1925.—A

study of the factors governing the behavior of enamels suspended in water as used for coating metal shapes.

F. G. J.

Why enamel products costs are low. KARL TURK. *Ceram. Ind.*, 4 [6], 453

(1925).—A description of the advances in the art of enameling that have reduced costs.

F. G. J.

Enamel plant built on 30 years' experience has flood of new ideas. ANON. *Ceram.*

Ind., 5 [3], 228(1925).—An illustrated description of the new plant of the Ironton (Ohio) Stove and Mfg. Co.

F. G. J.

Pyrometers abused in enamel plants. ANON. *Ceram. Ind.*, 5 [3], 233(1925).—

What to do and what not to do.

F. G. J.

Principles of enameling. VIII. Ground coat enamels for dry process enameling

of cast iron. HOMER F. STALEY. *The Ceramist*, 6 [1], 384-95(1925).—Very little is known about the fundamental principles of compounding and prepg. ground coat

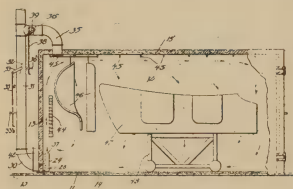
enamels. S. states requirements of a good ground coat enamel of the glassy type. S. compares several ground coat enamels that have been used successfully for long periods of time and calculates their "refrac. value." The refrac. value of a ground is supposed to indicate the general behavior of the ground when heated. S. discusses the percentage of raw additions and the relation of gloss to strength of bond. S. also points out further problems for research. (See following abstract.) A. E. R. W.

Principles of enameling. IX. Cleaning of iron and steel. HOMER F. STALEY. *The Ceramist*, 6 [4], 554-60(1925).—The more important subs. to be removed from iron and steel to be used in enameling are (1) oils and greases, (2) oxides or scale. The removal of oils is called "cleaning." The use of solvents produces a remarkably clean ware. Because of their expense, evaporation losses, fire hazard and injurious vapors solvents should only be used for removing non-saponifiable oils. Saponifiable oils should be removed by alk. solns. In prep. solns. the chem. that can be used are, in the order of their efficiency, caustic soda, trisodium phosphate, soda ash, sodium silicate and borax. Hard water should be avoided. With saponifiable oils the cleaning action depends on emulsification and subsequent saponification. The soap formed also exercises a cleaning action. With non-saponifiable oils the cleansing by alk. solns. depends on emulsification and subsequent gravity sepn. The stability of the emulsion can be increased by (1) increasing alkalinity, (2) using more soln., (3) adding small amts. of soap. Too much stability makes the subsequent gravity sepn. difficult. The addition of solid particles of colloidal size and agitation also increases stability. In electrolytic cleaning the main cleaning action results from the production of finely divided gases. Cutting and drawing oils should be so chosen as to contain just sufficient saponifiable oils to give a stable emulsion during cleaning. S. gives formulas for cleaning solns. A 3rd method of cleaning is by hgt. or "burning off." This also helps to remove strains. S. gives the particulars of good operation. See *Ceram. Abs.*, 4 [3], 59-61(1925) for previous articles in this series. A. E. R. W.

Status of sand tests. I. H. RIES. *Foundry*, 53, 531-4(1925).—The usual tests applied to sand are discussed and the importance of standardization of tests pointed out. Sieve tests are more rapid than elutriation tests. After sepn. into groups of grain size the best manner of expressing the results is important. Four plotting methods are shown. (C. A.)

PATENTS

Enameling oven. JOHN A. MILLER. U. S. 1,555,304, Sept. 29, 1925. In a heat treating device of the class described, a chamber having an entrance leading thereto, and a closure for said entrance, heating means located within said chamber, an air intake device located within said chamber in direct communication with the exterior atmosphere through an opening provided in the wall of said chamber and discharging directly into the interior of said chamber adjacent the lower portion thereof, said chamber being provided in one of its walls adjacent the lower end thereof with a ventilating opening communicating with said air intake device, and a ventilating conduit communicating with said opening and extending upwardly therefrom.



Glass

Forced draft gas generation. W. FRIEDMAN. *Glastechnische Ber.*, 3 [1], 8(1925).—In contrast to the steel indus. there are still in many glass works the old Siemens-Schütt generators with natural gas. Their advantages and disadvantages are discussed and compared with several types of forced draft generators. These are shown in drawings. Tables of relative efficiencies are given. F. G. J.

The microscopic structure of the surface of ground glasses. KARL HESSE. *Glastechnische Ber.*, 3 [2], 33(1925).—Fourteen photomicrographs of glass surfaces attacked by different agents. F. G. J.

The flame in the glass-melting furnace. K. HESSE AND W. FRIEDMAN. *Glastechnische Ber.*, 3 [2], 46(1925).—A long and thorough article on combustion as applied to the making of glass. The effects of excess air and of excess gas are studied. F. G. J.

Glasses as supercooled liquids. G. TAMMAN. *Glastechnische Ber.*, 3 [3], 73 (1925).—A long discussion of crystn., the relation of viscosity to the degree of supercooling, stability of glasses, etc. F. G. J.

Completely automatic glass blowing. WENDLER. *Glastechnische Ber.*, 3 [3], 87(1925).—Traces the history of automatic blowing from Atterbury in Pittsburgh in 1873 to modern times. The various advances are described and drawings are shown. F. G. J.

Investigation on the elasticity and breaking strength of glass as a building material. OTTO GRAF. *Glastechnische Ber.*, 3 [5], 153(1925).—The results of thirty years of testing building glass as well as recent work on test pieces of table glass. Results give the effect of load tests, impact tests and chem. anal. on many samples of 6 varieties of glass. There are numerous illus. on the methods of failure under test. F. G. J.

Measuring high gas temperatures by means of proper measurements of the oven elements. FOX MAULE. *Glastechnische Ber.*, 3 [4], 114(1925).—Discussion and mathematics of pyrometric lag. F. G. J.

Suggestions for better glass tank service. T. B. HART. *Ceram. Ind.*, 4 [6], 450 (1925). **Suggestion for regenerator improvement.** T. B. HART. *Ceram. Ind.*, 5 [2], 125(1925).—The drawing shown is a regenerative system that is in design recuperative. F. G. J.

Seven million dollar plant to have 15,000,000 sq. ft. annual plate glass output. ANON. *Ceram. Ind.*, 5 [1], 41(1925).—An illustrated description of the new Ottawa (Ill.) plant of the National Plate Glass Co. F. G. J.

Rapid test for purity of glass sand. ANON. *Ceram. Ind.*, 5 [2], 133(1925).—Describes a rapid approx. detn. of iron oxide in sand and a complete plant anal. of sand. F. G. J.

A good glass annealing schedule. ANON. *Ceram. Ind.*, 5 [3], 220(1925).—This article tells of the successful schedules used at the Gill Glass Co. F. G. J.

Chemical relations of glass, glazes and enamels. IV. ED. ZSCHIMMER. *Ceram. Ind.*, 5 [3], 225(1925).—A study of various typical glasses and a table of percentage comps. of 13 characteristic glasses. For parts I, II and III of this subject see *These Abs.*, p. 337. F. G. J.

A plant analysis for lime. ANON. *Ceram. Ind.*, 5 [3], 227(1925).—This article tells what anal. should be made for control work and how to make them. F. G. J.

Researches carried out at the Russian State Physico-Chemical and Rontgenological Institute. N. I. SIELAKOV. *Rev. Metal.*, 21, 527-8(1924).—No indications of crystal structure were found in careful X-ray investigation of glass. In investigating clays it was found that highly plastic clays showed a fine crys. structure (diam. 6×10^{-7} cm.) while less plastic clays were much coarser. In clays excess silica increases the dispersion of the crystal system. W. M. C.

✓ **Principles of glass making.** R. R. SHIVELY. *The Ceramist*, 6 [1], 396-9(1925).—S. reviews the reliable work that has been done on the effect of different chem. on the phys. properties of glass including (1) thermal expansion, (2) density, (3) elasticity, (4) tensile strength, (5) thermal condy., (6) crushing strength, (7) viscosity. See also *Ceram. Abs.*, 4 [3], 62-3(1925). A. E. R. W.

Washed pot clay for tank blocks. J. L. CRAWFORD. *The Ceramist*, 6 [3], 499-504(1925).—C. describes the mining, weathering and washing of Cheltenham clay and cites the advantages of using washed clay for tank blocks. A. E. R. W.

The influence of boric oxide in chemical glass. W. E. S. TURNER. *Pottery Gaz. and Glass Trade Rev.*, 50 [579], 1391(1925).—Tests with simple glasses showed that boric oxide has its limitations. It was then substituted for silica step by step in Kavalier glass. Between 11% and 13% boric oxide decreased the soly. of glass. Within limits it also reduces the thermal expansion. F. G. J.

Construction of glass pots in North America. H. SCHNURPFEL. *Feuerfest*, 1 [5], 46(1925).—Difference between European and Amer. practice shown. The latter are made thinner and lighter and have longer life. German clays such as Gross Almerode, Meissen and Vallendar used for bond and Amer. clays in form of grog. Importance of proper tempering stressed. F. A. W.

Structure of glass. N. SELJAKOV, I. STRUTINSKI AND A. KRASNIKOV. *Z. Physik*, 33, 53-62(1925); *Jour. Soc. Chem. Ind.*, 44B, 716(1925).—The refractive index and coeff. of expansion of glass show a max. near 575°, which is the transition temp. of α -quartz to β -quartz. X-ray analysis, however, shows no signs of quartz crystals, and it is concluded that the change at this temp. is a change in the molecule of the glass, and that glass can truly be looked on as a supercooled amorphous fluid. The structure of α -cristobalite is worked out from X-ray data, and that of β -cristobalite is suggested. H. H. S.

Adsorption of water from the gas phase on plane surfaces of glass and platinum. I. R. McHAFFIE AND S. LENHER. *J. Chem. Soc.*, 127, 1559-72(1925); *J. Soc. Chem. Ind.*, 44B, 716(1925).—Adsorption of water and its accompanying free energy change are much greater on glass than on Pt. The thickness of the adsorbed film varies from 0 to 39 molec. layers with different temps. and pressures. H. H. S.

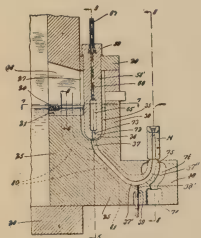
Flint glass industry. ANON. *Jour. Soc. Chem. Ind.*, 44B, 850(1925).—The British flint glass industry's application for Govt. aid under the Safeguarding of Industries Act has been refused, though it is hoped only temporarily. H. H. S.

Quartz filters. ANON. *Chem.-Zeit.*, Aug. 25, p. 716(1925); *Nature*, 116, 516(1925).—Experimental tests on quartz crucibles with filtering bottoms have been made by the Jena firm of Schott und Gen. The porous bottoms are made from the same mat. as the crucibles themselves, and in the case of those made from rock crystal the analytical results were highly satisfactory, even when normal solns. of ammonia or caustic alkalis were used for washing ppts. The speed of filtration is rather slower than with ordinary asbestos pads in the Gooch crucibles. The analytical results obtained with the opaque crucibles were not quite so good, but the latter are suitable for filtering very hot liquids. O. P. R. O.

Uniform temperature maintained in glass tank with Amco recuperator. C. B. McCOMAS. *Fuels and Fur.*, 3 [9], 1053-4(1925).—The construction and operation of the recuperator is described. R. M. K.

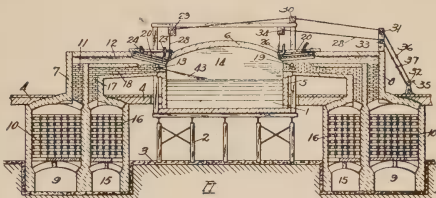
PATENTS

Glass mold-filling apparatus. WILLIAM G. BERGMAN. U. S. 1,554,195, Sept. 22, 1925. In a glass mold filling app., a chambered body engaged with the fur., a nozzle adapted to discharge melted glass into a mold, an internal conduit formed in said body between said fur. and said nozzle, means for draining said conduit comprising a removable plug located at the base of said conduit, an injector in said body, and means operatively combined with said injector for exhausting or compressing the air therewithin.



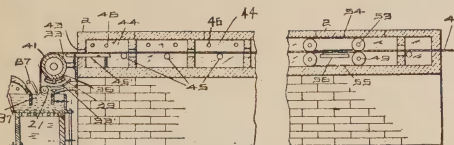
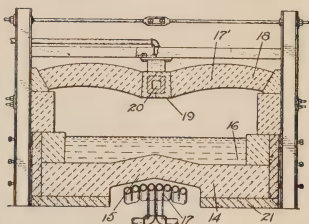
Glass-melting furnace. BJARNE H. SCHIELDROP. U. S. 1,554,251, Sept. 22, 1925.

In a glass melting fur, an enclosed passage for conducting heated air to the fur., gas feeding means projecting into the passage near its entrance to the furnace, said means comprising a pair of nozzles positioned one above the other so that the two streams of gas will be directed into the fur. along converging lines in the same vertical plane, and means for independently swinging the nozzles in a vertical plane to vary the point of contact of the two flames, or to vary the inclination of the resulting fan-shaped flame with respect to the surface of the molten glass.



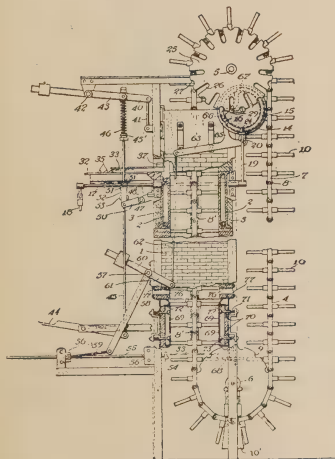
Drawing sheet glass. ROBERT G. EWING. U. S. 1,554,267, Sept. 22, 1925. In combination with app. for drawing a sheet of glass from a mass of molten glass, a smooth surfaced cylindrical cooling roller substantially as long as the sheet width and positioned in contact with one face of the sheet near its source. In the drawing of sheet glass, a hollow fluid-containing porous bending roller. In a sheet glass drawing app. a temp.

affected roll for extending transversely of a sheet of glass, said roll having internal radiation surface increasing inwardly of the sheet from an edge of the sheet of glass.

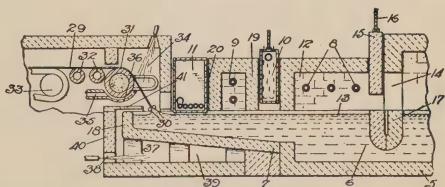
**Cooler-chamber construction.** ENOCH T. FERNGREN. U. S. 1,554,268, Sept. 22, 1925. In sheet glass app., including a cooling chamber, means for continuously passing a stream of molten glass there-through, means for retarding the flow of the central portion of the stream, and means for increasing the column of heat above the border portion of said stream of glass.

Leer. ROBERT GOOD. U. S. 1,554,275, Sept. 22, 1925. In a vertical leer for annealing glassware,

an endless conveyor having one run thereof adapted to move downwardly through the leer, a plurality of leer pans carried by the conveyor and means cooperating with the leer pans for sealing one end of the leer.

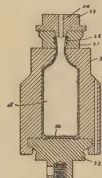


Sheet-glass apparatus. ENOCH T. FERNGREN. U. S. 1,554,269, Sept. 22, 1925. The process of



producing sheet glass, consisting in alternately heating and cooling the surface of a mass of molten

glass to create a floating unit of plastic glass on a body of molten glass and then drawing the floating unit off in sheet form.

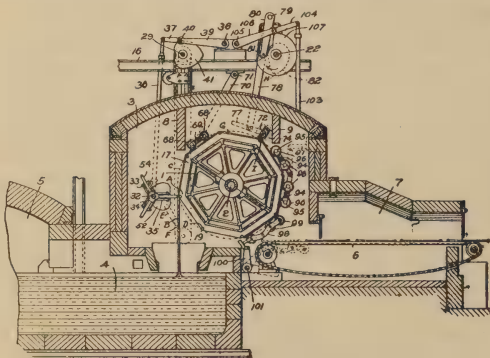


Process of molding bottles. JOHN RAU. U. S. 1,554,464, Sept. 22, 1925. The process of forming a bottle or the like of glass, consisting of blowing a blank having a neck with a head thereon of the usual character and forming at opposite end of said blank an enlarged portion extending laterally beyond the walls of the blank.

Continuous-glass-drawing device. HECTOR BAZIN and ARSENE BAYLE. U. S. 1,554,547, Sept. 22, 1925.

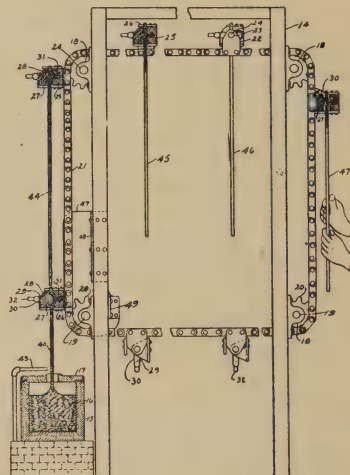
A glass sheet drawing mach., provided with endless carriers, a frame for supporting the said endless carriers, bearing brackets suitably attached to the said endless carriers, a glass sheet clamping device adapted to swivel in the said bearing brackets and blocks attached to the said frame, the said blocks contacting with and guiding the said glass sheet clamping device to a position adjacent the glass sheet without deflecting the said glass sheet from its drawing position.

Process and apparatus for drawing glass. HERMAN S. HEICHERT. U. S. 1,554,848, Sept. 22, 1925. In combination in a glass drawing app., a receptacle for a glass bath, a drawing drum located over the bath and provided intermediate its corners with flattening plates, and a heat-

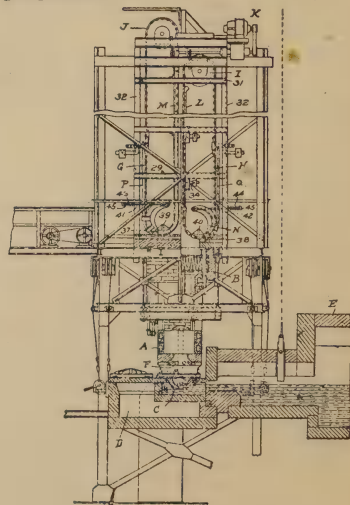


Apparatus for drawing sheet glass. HALBERT K. HITCHCOCK. U. S. 1,554,850, Sept. 22, 1925. A drawing device for sheet glass comprising a pair of opposing endless belts for gripping the sheet therebetween and means for driving the belts, one of the said belts being provided at intervals with transverse slots to permit the cutting of the glass while passing along between the belts.

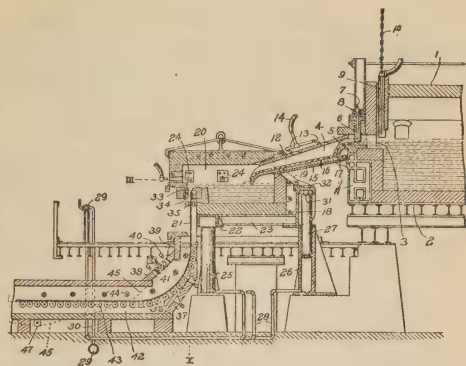
Process and apparatus for making sheet glass. HALBERT K. HITCHCOCK. U. S. 1,554,851,



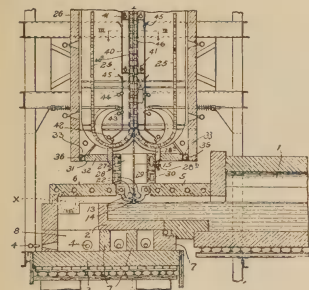
ing element for engaging the glass sheet which is drawn along the line at which the glass is bent preliminary to its engagement with the corners of the drum and for continuing such engagement as the bending progresses.



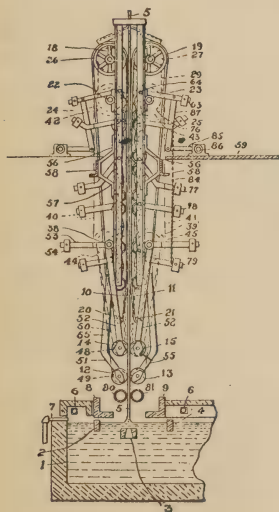
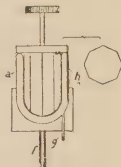
Sept. 22, 1925. In combination in app. for forming sheet glass, a melting tank, a secondary tank in position to receive a gravity flow of molten glass from the melting tank, mounted for vertical movement and provided with a discharge slot directed downwardly, means below the slot for receiving and turning laterally the ribbon of glass discharged through the slot and a horizontal leer in position to receive the ribbon from said means and provided with means for carrying it there-through.



Apparatus for making sheet glass. HALBERT K. HITCHCOCK. U. S. 1,554,852, Sept. 22, 1925. App. for drawing sheet glass, comprising a tank extension carrying a bath of molten glass and having a cover provided with a transverse opening, a slot member mounted in said opening, means for supporting said slot member so that it may be moved vertically above the cover portion and then longitudinally of the extension drawing and annealing mechanism located above the slot member and a drawing chamber between said drawing mechanism and slot member mounted for movement laterally to provide clearance for the positioning and removal of the slot member.

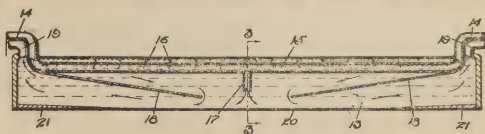


Method for the production of double-walled glass vessels. WILHELM HODECKER. U. S. 1,554,853, Sept. 22, 1925. A method for producing double walled glass vessels, vacuum flasks and the like, by blowing in a mold a hollow glass body to the shape of the finished outer walls of the vessel including the complete doubled rim of the vessel and providing a dome portion thereon which subsequently forms the inner walls of the vessel.



Process of drawing sheet glass. HARRY G. SLINGLUFF. U. S. 1,554,886, Sept. 22, 1925. A process of producing sheet glass continuously from a glass bath which consists in applying rotating frictional drawing means to the sides of the sheet above the surface of the bath sufficient to continuously draw the sheet, chilling the glass by radiation, below said means, so that the sheet is below its temp. of setting when it reaches said drawing means and applying a heat insulation against the sides of the sheet above the drawing means and continuing said insulation until the glass cools sufficiently to be cracked off.

Cooler for sheet-glass apparatus. ENOC T. FERN-
GREN. U. S. 1,554,994, Sept. 29, 1925. In sheet glass

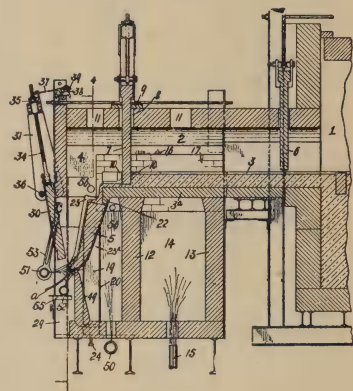
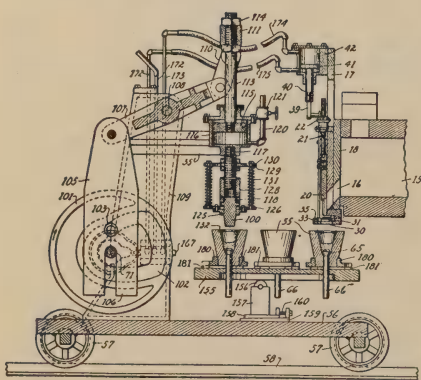


app., means for drawing a sheet of glass from a mass of molten glass, of means for lowering the temp. of the surface glass thereof before it is drawn into the sheet, including means for introducing a cooling medium in proximity to and centrally of the said glass and allowing the cooling medium to pass from the center toward both sides of said mass of molten glass.

Glass-blowing-spindle apparatus. AUGUST KADOW, ALVAH C. PARKER and CARL W. SCHREIBER. U. S. 1,555,216, Sept. 29, 1925. In combination, a glass carrying spindle journaled in two bearings, jaws for clamping a blank upon the spindle, and jaw closing means mounted to move inside of one of said bearings.

Method and apparatus for making sheet glass. EDWARD DANNER. U. S. 1,555,358, Sept. 29, 1925. The method of forming sheet glass, consisting in causing molten glass to flow in laterally divided form around and down a directing part in a tempering heat and in merged single sheet form therefrom. In an app. for forming sheet glass, means forming a molten glass supply and having a discharge outlet in its bottom portion, means cooperating with said outlet to partially close the same and to cause glass to flow therefrom in laterally

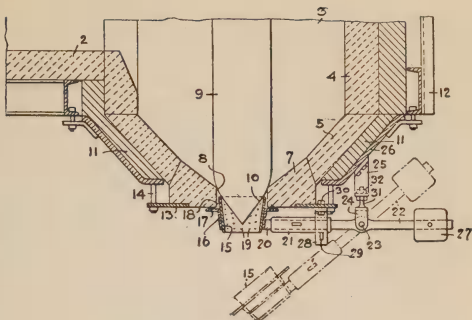
divided streams which merge and flow in single sheet form from the lower end thereof, said second means being adjustable relative to the first means to regulate the size of the opening and the consequent thickness of the glass streams flowing therefrom, and means for controlling the temp. of the glass flowing down said second means.



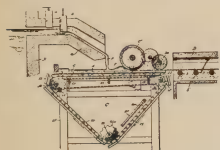
Glass-molding machine. SAMUEL ESTE WINDER and HENRY COTTON DAUBENSPECK. U. S. 1,555,897, Oct. 6, 1925. In a glass working mach. the combination with a mold, of a pressure plunger adapted to cooperate with said mold, reciprocating means, means comprising a cylinder and piston connection operatively connecting said reciprocating means and said plunger, means for supplying fluid pressure between the cylinder and piston and adjustable means in said fluid pressure supplying means for checking back flow from said cylinder, whereby an adjustable pressure greater than the supply pressure may be intermittently built up.

Insulating cement or mortar. LYLE CALDWELL. U. S. 1,556,488, Oct. 6, 1925. An insulating cement or mortar composition consisting principally of powdered diatomaceous earth and an organic adhesive and containing not over 7% of a salt adapted to act as a distending agent with respect to said organic adhesive.

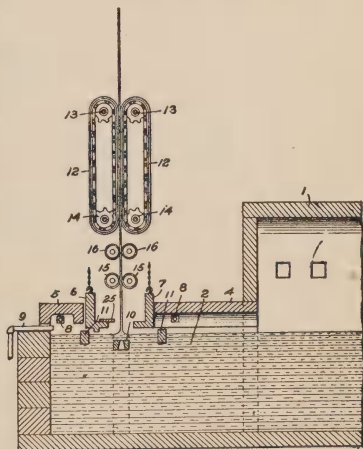
Method and apparatus for casting plate glass. FRANK E. TROUTMAN and CHARLES H. CHRISTIE. U. S. 1,556,381, Oct. 6, 1925. The method of casting plate glass that comprises flowing the glass through a downwardly opening outlet in a receptacle, checking the descent of the sides of the issuing glass and causing a portion of said glass to form a discharge throat, and discharging another portion of glass through said glass-lined discharge throat upon a casting table.



Art of producing continuous sheet glass. CLARENCE W. AVERY and EDWARD T. BROWN, U. S. 1,556,665, Oct. 13, 1925. In the art of producing continuous sheet glass, the method of forming the sheet which consists in establishing an unconfined pool of the molten metal on a flat traveling surface in advance of and leading to a forming pass with the pass dimensions substantially equal to the thickness of the sheet and greater than the width of the sheet and continually passing metal from the pool through the pass to form the sheet, whereby the unconfined characteristic of the pool will be maintained within the pass with respect to the sheet edges, the pool characteristic being maintained by a continuous supply of metal thereto, the width of the sheet being produced by the natural flow of metal within the pool.



Glass-drawing apparatus. HARRY G. SLINGLUFF. U. S. 1,556,726, Oct. 13, 1925. In combination in app. for drawing sheet glass, a glass drawing tank adapted to carry a bath of molten glass, at a particular level, means for drawing a sheet upward from the bath and a refrac. bar in the bath and extending transversely across the tank below said level of the bath and the line of generation of the sheet, said bar having its upper portion of varying width, widest at the center portion and decreasing in width toward the end portion.

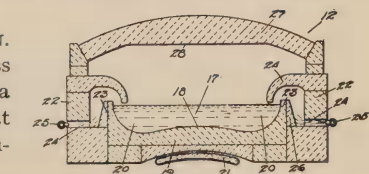


Metallic mold for forming glass articles and method of making same.

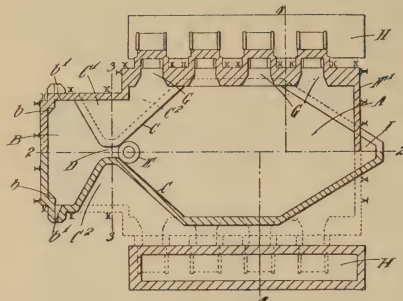
FRED JAMES FRINK and ROBERT LEONARDSON

FRINK. U. S. 1,556,925, Oct. 13, 1925. A mold for forming articles from molten glass, said mold being made of a metallic alloy and having its inner surface of a vascular or finely pitted character.

Sheet-glass apparatus. ENOCH T. FERNGREN. U. S. 1,557,148, Oct. 13, 1925. In sheet glass apparatus, including a draw-pot containing a source of molten glass, of means for directing heat along the border portions of the molten glass within said pot.



Glass-melting furnace. THOMAS COURTNEY MOORSHEAD. U. S. 1,557,078, Oct. 13, 1925. A glass melting tank fur-



comprising a melting compartment, a working compartment, a bridge wall separating said melting compartment from said working compartment, the sides of said bridge wall being so disposed relatively to both the working and melting compartments as to avoid right angled corners in which dormant glass can collect and the other boundary walls of said melting compartments being also so formed as to avoid right angled corners.

Apparatus for molding glass. ALFRED P. VOLLMAR. U. S. 1,557,504, Oct. 13, 1925. A machine for molding glass comprising a

table mounted for horizontal rectilinear movement adapted to receive a layer of soft or plastic glass as it is moved horizontally, said table having a plurality of spaced apertures, a vertically movable die mounted in each of said apertures, a vertically movable table carrying die members adapted to move downwardly into engagement with the upper surface of the layer of glass on the horizontal table when said horizontal table is positioned under said vertically movable table with the dies in the upper and lower tables in coöperating relationship and means for withdrawing the upper tables and dies and lowering the lower set of dies and permit the molded glass to rest on said horizontally movable table free from the die members.

Process of manufacturing resistant glass. VÁCLAV HORÁK. U. S. 1,557,540, Oct. 13, 1920. The method of manufacturing a resistant glass, which will support a sudden fall of temp. from 320° to 0°C consisting in melting at about 1200°C a mixture of sand, boric acid, potassium carbonate, sodium carbonate, kaolin, muscovite, zirconic oxide and titanic oxide.

Glass composition. W. C. TAYLOR. Can. 248,316, Mar. 31, 1925. A low-expansion glass contains over 70% SiO₂, B₂O₃ 10-15, Al₂O₃ 1-5, Na₂O less than 6, LiO 0-2, and ZrO 0-6%. (C. A.)

Frosting glass. M. PIPKIN. Brit. 228,907, Feb. 4, 1924. NH, bifluoride or an alkali metal bifluoride is used subsequent to the usual treatment for frosting the inside of elec. lamp bulbs or other glass articles. This treatment is stated to strengthen the walls of lamp bulbs. (C. A.)

Heavy Clay Products

Brickmaking and the use of brick in Sweden. II. G. WSON CRONQUIST. *The Clay Worker*, 83 [6], 53(1925). (For Part I see *Ceram. Abs.*, 4 [7], 193(1925).)—Continuous kilns are used almost entirely in Sweden and there is not a single round down-draft kiln there. Continuous tunnel kilns are standard in sizes with output of 6000 to 30,000 bricks daily. Fired to 1000°C it needs 5% coal to weight of fired brick. The firings are even and the kiln is economical to set and empty. There is much coal with 50% ash and some shale containing coal. This is fired in great charring stacks to make grog. The ashes from the gas producers are also used for grog.

F. G. J.

Saving fuel in brick manufacture. W. D. RICHARDSON. *The Clay Worker*, 84 [1], 26(1925).—Calls attention to Cronquist's article and expands on 2 of his points: the general use of continuous tunnel kilns and of cheap coal in gas producers. Points a moral to American brickmakers.

F. G. J.

Brick. D. KNICKERBAKER BOYD. *The Clay Worker*, 84 [1], 22(1925).—A long paper presented at the annual meeting of the A. S. T. M. discussing the methods of

testing brick. B. advocates stressing the tests on walls and piers rather than on individual brick. Different tests are discussed separately and modifications are suggested.

F. G. J.

Advantages and disadvantages of the tunnel kiln. II. ANON. *The Clay Worker*, 83 [6], 526(1925). (For Pt. I see *Ceram. Abs.*, 4 [7], 199(1925).)—A description by Walter Pohl of two successful attempts to make brick in tunnel kilns designed for other purposes. In one case full details of coal consumption and output are given. *Ibid.*, III. ANON. *The Clay Worker*, 83 [7], 629(1925).—An anonymous criticism of the above stating that the efficiency shown was less than that of a ringofen. *Ibid.*, IV. ANON. *The Clay Worker*, 84 [1], 28(1925).—A description by Bernhard Ultsch of a tunnel kiln, style Lengersdorf, with pressure gas hgt. and a length of 92 m. for the firing of brick and roofing tile. A temp. of 1688°F (cone 09a) is attained. For a daily production of 12,000 bricks, Austrian standard, weighing 57,000 kg., 2400 kg. of brown coal is required, 4.2%. With hard coal, it is estd. that 2.9% would be needed.

F. G. J.

Face brick in "Home Town" movie. ANON. *Brick and Clay Rec.*, 66 [9], 663(1925).—The Amer. Face Brick Assn. with 19 other nationally known firms and associations is sponsoring a movement to "Boost your town-trade at home." Face brick comes in for a good measure of attention in the campaign.

F. G. J.

Humidity driers for sewer pipe. ANON. *Brick and Clay Rec.*, 66 [9], 668(1925).—Discussion on the suitability of the humidity drier to replace the huge drying floors of the sewer pipe industry. Each side of the question is presented by an authority in the manuf. of clay products.

F. G. J.

Asks for contributing factors to bad case of tile lamination. ANON. *Brick and Clay Rec.*, 66 [10], 750(1925).—Several interesting answers are given by responsible clay products mfrs.

F. G. J.

Thirty-three per cent more pipe with same equipment. ANON. *Brick and Clay Rec.*, 66 [9], 675(1925).—A discussion of the merits of piecework over day rate of pay.

F. G. J.

The problem of shading. J. G. SEANOR. *Brick and Clay Rec.*, 66 [10], 758(1925).—How it can be made easier. Helping the men to produce better results. Should you suit the salesman's pleasure or the superintendent's convenience?

F. G. J.

Better colors for clay products. D. A. MOULTON. *Brick and Clay Rec.*, 66 [11], 824(1925).—Methods to secure a better red are briefly given.

F. G. J.

Better colors for clay products. P. E. COX. *Brick and Clay Rec.*, 66 [11], 824(1925).—The column of clay may be sprayed with glaze from a battery of spray guns.

F. G. J.

The tractor's place in clay winning. H. L. AUSTIN. *Brick and Clay Rec.*, 66 [11], 828(1925).—How one plant is successfully using tractors and scrapers in its clay pit.

F. G. J.

Making common brick on a wholesale scale. ANON. *Brick and Clay Rec.*, 66 [12], 900(1925).—Third plant of the Lake View Brick Co. opened. It uses waste heat driers and lime instead of grog.

F. G. J.

Making 100,000 brick with 44 men. ANON. *Brick and Clay Rec.*, 66 [13], 973(1925).—The plant of Camp Brothers Co., Mogadore, Ohio is described. It has many labor saving devices.

F. G. J.

Why do preliminary crushing? ANON. *Brick and Clay Rec.*, 66 [13], 983(1925).—A discussion of the advantages of prepg. hard clays and shales before giving them to the dry pan. This saves time, men, money and gives you a better product.

F. G. J.

When it pays to replace machinery. B. A. FRANKLIN. *Brick and Clay Rec.*, 66 [13], 987(1925).—Machine equipment must do more than lower the price and raise the quality of its output over the hand labor which it replaces. It must match or excel the output of competitors' machines. Worn out and obsolete equipment carries insidious dangers. A formula is given to tell when to replace any machine.

F. G. J.

Brick and tile in building codes. ANON. *Brick and Clay Rec.*, 67 [1], 30(1925).—Complete excerpts are given from the report of Secy. Hoover's Building Code Committee on Recommended Minimum Requirements for Masonry Wall Construction. This rept. will be used throughout the country in revising antiquated bldg. codes and drafting new ones.

F. G. J.

Grinding 1500 tons of shale daily. ANON. *Brick and Clay Rec.*, 67 [1], 38 (1925).—A description of the grinding process of the Metropolitan Paving Brick Co. at Bessemer, Pa.

F. G. J.

Care and operation of a dry pan. A. F. GREAVES-WALKER. *Brick and Clay Rec.*, 67 [1], 40(1925).

F. G. J.

Manufacturing "Summitville reds." ANON. *Brick and Clay Rec.*, 67 [2], 111 (1925).—An account of the Summitville (Ohio) Clay Products Co.

F. G. J.

Model building code attacked. ANON. *Brick and Clay Rec.*, 67 [3], 179(1925).—Claims of unfairness and partiality are made and apparently substantiated against the report of the building code committee of the U. S. Dept. of Commerce. Some of the sections are detrimental to brick.

F. G. J.

The editor builds his third plant. ANON. *Brick and Clay Rec.*, 67 [4], 252 (1925).—A description of the new plant of the Alliance Brick Co., at Darlington, Pa., making face brick.

F. G. J.

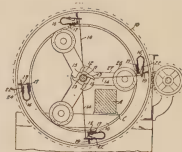
Brick laying machine. ANON. *Contract Rec. and Eng. Rev.*, 39, 975(1925).—A machine for laying brick is said to have been perfected, called the "K" erector, made by Wm. Arrol of Glasgow where it is being used. It consists of tubular uprights, connected at top and bottom, and free to travel on rails laid along the outside walls. Across the width of the house to be built, and carried on the uprights, is a boom which can be raised and lowered. On it are mounted a small traveling carriage, the mortar tank and the bricklaying mechanism. With the last named over the starting point the laying wheel rotates, taking 2 bricks at a time from the hopper, while the measg. mortar wheel spreads the mortar. Thus, as the carriage moves across the boom, one row of brick is laid. When the end of the wall is reached the direction of the carriage can be changed and the movement of the machine adjusted so as to lay brick along one of the side walls, and then across the back and up the other wall to the point where the work was started. After a course has been laid all around, the boom has to be raised by the thickness of one brick, plus the mortar joint and the operation repeated until the desired height is reached. Provision is made for automatically cutting off the supply of brick and mortar whenever a doorway or window intervenes. The feeding of the brick into the hopper is best performed by hand and the speed at which the machine lays the brick is regulated thereby. The average is said to be between 1200 and 1500 bricks per hr.

O. P. R. O.

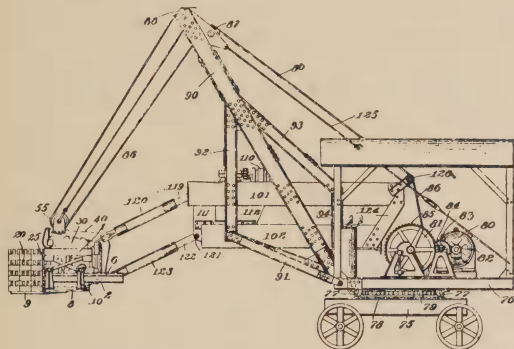
PATENTS

Silica-lime brick and method of producing the same. CARL MENDIUS. U. S. 1,554,639, Sept. 22, 1925. The process of making a brick which consists in mixing with virgin granulated blast fur. slag a small quantity of lime and a small quantity of a hard crushed material high in silica content, forming the mass in a moistened condition and under heavy pressure into the desired shape, and then curing the brick by subjecting it for several hours to steam at a high pressure.

Brick or block cutter. ALEXIS PRESTON STEELE. U. S. 1,555,769, Sept. 29, 1925. In a cutter of the class described employing a reel having cutter wires and bars disposed about the reel and provided with springs for tensioning the cutter wires: a block on that arm of each spring to which a wire is attached, the bars carrying the springs having slots affording clearance for the movement of an arm of each spring and said blocks each adapted to gravitationally assume a position at a slot of the angle bar or a position away from said slot so that in one position of each block said spring arm may have movement to the full extent of a slot and another position of the block the movement of the spring in said slot will be limited.



Brick-setting apparatus. GRAFTON E. LUCE. U. S. 1,555,785, Sept. 29, 1925. App. of the kind described comprising a brick setting device, a pivoted support said device, a crane mounted, with provision for a full circle swing and connected to said support by flexible cables to raise or lower the support and brick setting device, in combination with automatic means to maintain the brick setter substantially horizontal within its range of movements.



Hollow-building-wall construction. FREDERICK HEATH. U. S. 1,556,333, Oct. 6, 1925. A building hollow wall construction, comprising hollow blocks throughout, arranged in courses and having even continuous horizontal mortar beds, each course having one or more three void blocks having side and intermediate load bearing webs, the intermediate webs being separated by a median longitudinal void, and each course including blocks having vertical voids with webs and shells spaced apart distances corresponding to the spacing of the webs and shells of the three void blocks, each block in the structure being preferably arranged in overlapping relations with blocks in courses above and below to provide a bonded structure, all of the load bearing webs and shells of the two forms of blocks throughout the entire wall construction including corners and pilasters lying in true vertical planes and forming continuous vertical compression members throughout the entire structure.

Refractories

Refractoriness of clays. H. SALMANG. *Archiv. für Warmewirtschaft*, **6**, 241-2 (1925).—The factors affecting the value of clays for high temp. services are discussed. For testing refrac. clays, the softening point detn. is more reliable than chem. anal. but may be from 300° to 500°C above the max. safe temp. for service under load.

E. E. P.

Flux block or fire brick for smelters? E. B. PRENTICE. *Ceram. Ind.*, **5** [3], 235 (1925).—Lack of standardized sizes prevents the use of blocks. Standard fire bricks should be used with very thin joints.

F. G. J.

Refractories Institute defined. J. D. RAMSAY. *Brick and Clay Rec.*, **66** [9], 661 (1925).—Central bureau to develop real research work and forum for consumer and producer problem discussion are its main objects.

F. G. J.

Refractory classification and characteristics. H. W. BROOKS. *Brick and Clay Rec.*, **66** [10], 763(1925). (Reprinted from *Power*).—A classification of the well-known refractories and the principal considerations governing correct refrac. application.

F. G. J.

Unusual processes in dry pressing fire brick. ANON. *Brick and Clay Rec.*, **66** [12], 904(1925).—Research and repeated plant experiments by the Niles (Ohio) Fire Brick Co. solved the problem of dry pressing fire brick.

F. G. J.

They make no second grade ware. ANON. *Brick and Clay Rec.*, **67** [3], 191 (1925).—An account of the Massillon (Ohio) Stone and Fire Brick Co.

F. G. J.

Preliminary findings in refractory investigations. I. RALPH A. SHERMAN, P. D. HELSER, H. W. BROOKS AND G. A. BOLE. *Power*, **62** [7], 234(1925).—The Bureau of Mines in coöperation with 18 companies has undertaken an investigation of problems connected with boiler-fur. refrac. Among the causes of refrac. failure studied are fusion, distortion under load, spalling, slag action, failure of support, thermal expansion and contraction, permanent vol. change and fur. wall construction. *Ibid.*, **II.** P. D. HELSER AND G. A. BOLE. *Power*, **63** [8], 277(1925).—The 2nd part of this investigation deals with the raw mats. entering into and the methods of manuf. of boiler-fur. refrac. Flint, plastic and siliceous fire clays are among the principal refrac. mats.; some of their phys. chem. and geological properties are given. Among the special refrac. materials studied are diaspore, bauxite, kaolin and silicon carbide. The method of manuf. and influence of properties on the ware forms an interesting part of this investigation.

C. J. H.

Radiation in the pulverized-fuel furnace. WALTER J. WOHLNBERG AND DONALD G. MORROW. *Mech. Eng.*, **47** [8], 627(1925).—It is shown that the radiating power through the flame surface depends primarily on the size of the particle and that, based on the flame surface area, its magnitude is low. The heat absorption intensity at the cold surface, however, may be considerably higher than the relative radiance of the flame. This factor depends on both the amt. and disposition of the refrac. fur. lining. Curves are given supplementing the analytical process by which the method outlined may be applied.

C. J. H.

Boiler furnaces for pulverized coal. A. G. CHRISTIE. *Mech. Eng.*, **47** [8], 632 (1925).—An anal. of the fund. of combustion of pulverized coal indicates that the following conditions are desirable for the highest efficiency and max. capacity of a given fur.: Coal should be finely ground, thoroughly dry and preheated. Primary and sec. air should be highly preheated. Turbulence should exist inside fur. The walls should be water cooled. Among the topics discussed are methods of heat transfer, nature of combustion, fur. walls, air preheaters, coal driers and ash.

C. J. H.

Refractory materials for coking chambers and gas plants. I. LITINSKY. *Feuerfest*, **1** [7], 65(1925).—Between the 2 extremes of silica (acid) and clay (basic) brick lies the group of intermediate brick contg. both quartz and fire clay grog. The expansion of the silica is neutralized by the shrinkage of the grog at high temps. resulting in a brick of stable vol. A general description of the origin and characteristics of the various raw mats. used follows.

F. A. W.

The influence of oxidizing and reducing atmospheres on refractory materials. A. E. VICKERS AND L. S. THEOBALD. *Trans. Ceram. Soc. (Eng.)*, **24**, 87–97(1924–25); *Ibid.*, **II.** **24**, 98–104(1924–25); *Jour. Soc. Chem. Ind.*, **44B**, 716–7(1925).—Abstracted in *Ceram. Abs.*, **4** [11], 309(1925).

H. F. S.

The relation between under-load refractoriness, ordinary refractoriness and composition, physical and chemical, of refractory materials. Pt. II. Firebricks. A. J. DALE. *Trans. Ceram. Soc. (Eng.)*, **24** [2, 3], 170–98(1924–25).

H. F. S.

An investigation of the effects of load, temperature and time on the deformation

of firebrick material at high temperatures. A. J. DALE. *Trans. Ceram. Soc. (Eng.)*, **24**, 199-215(1924-25). Also *Jour. Soc. Chem. Ind.*, **44B**, 717(1925).—Abstracted, *Ceram. Abs.*, **4** [11], 310(1925).
H. F. S.

Present state of knowledge of the resistance of smelting industry refractories toward changes in temperature. W. STEGER. *The Ceramist*, **6** [1], 374-84(1925).—The sensitiveness of a body to temp. changes depends on not only the chem. compn. but also the shape and physical structure of the body. S. discusses rapid methods of measg. a body's resist. to temp. change and also the formula of Winklemann and Schott for calcg. it from measurable phys. constants. The resist. to spalling of a fire brick depends on (1) structure, (2) porosity, (3) chem. compn., (4) firing temp. S. summarizes the results of 6 investigations of the temp. sensitivity of clay fire brick. The resist. of silica brick to temp. change is dependent upon the mineralogical character of the silica. S. agrees with Mellor that the sensitiveness of magnesite brick is due to (1) incomplete preliminary firing of the magnesite, (2) the large coeff. of expansion of magnesite. S. questions Mellor's demonstration of the existence of 2 forms of magnesite as Mellor's results can be attributed to the fact that the sp. gr. of amorphous magnesite depends on the firing temp. of the magnesite used in its production as shown by A. Ditte. A further cause of the sensitivity of magnesite brick is found in its high degree of sintering.
A. E. R. W.

Present state of knowledge concerning the resistance of smelting industry refractories towards changes in temperature. W. STEGER. *The Ceramist*, **6** [2], 452-69(1925).—While the behavior of magnesite and silica brick toward changes in temp. have been fully explained we have as yet no good explanation of the very different behavior of different fire clay brick. S. describes app. for measg. the coeff. of expansion of refrac. By measg. the expansion of a fire brick over 4 ranges of temp. the effects of quartz inversions can be shown. S. concludes from his measurements that the difference in resist. to thermal shock shown by different kinds of fire brick can be explained on the basis of the amt., size of grain and cryst. form of the SiO_2 modifications that may be present.
A. E. R. W.

The temperature gradients obtained by different rates of heating in unfired fire-clay bricks, between 15°C and 250°C. L. S. THEOBALD AND A. T. GREEN. *Trans. Ceram. Soc. (Eng.)*, **24**, 105-23(1924-25).—The temp. gradients obtained by different rates of heating in unfired fire clay brick between 15° and 250°C have been investigated by a method which det. the exterior and interior temps. of the unfired brick submitted to various rates of heating in a specially designed app. A consideration of the "gradient-ratio" curves shows that when the max. value of the ratio is obtained, the interior temp. of the brick lies between 117° and 121°C. This fact suggests that all the mech. and hygroscopic water has been expelled when this interior temp. has been reached. Also, it may be assumed that practically the whole of the water leaves the brick between the temps. of 100°C on the exterior and 120°C in the interior of the brick. The time required to establish these conditions varies with the temp. diffusivity of the mat., the amt. of water present and the rate of heating of the brick. It appears that the maintenance of an adequate constant temp. during the period of evolution of steam would be an effective method of preventing the production of large strains. From data obtained, the min. time required for the safe rate of heating the green brick to a temp. of 250°C has been considered for 3 types of brick investigated under the particular conditions described.
H. F. S.

Observations on the elimination of carbonaceous matter from fireclay bricks. L. S. THEOBALD AND A. T. GREEN. *Trans. Ceram. Soc. (Eng.)*, **24**, 159-69(1924-25).—The mat. used was Stourbridge fire clay as this seemed to show the elimination of the carbonaceous matter to the greatest advantage. Under the particular conditions of

the heat treatment, no change is apparent in the test specimen at temps. below 500°C, but at 600°C oxidation has, undoubtedly, commenced. With full-sized brick drawn from actual firings the cores become distinctly darker and blacker as the time at 600°C is increased, indicating that as htg. continues further changes are taking place in the carbonaceous matter in the center of the piece. As soon as the temp. approaches 650°C, a white ring, which develops into a yellow area, follows the removal of the carbonaceous matter. Above 600°C some chem. action takes place in a deficiency of air in the interior of the piece, which is manifested as a yellowish area replacing the carbon. On htg. to 750°C, there is a darkening in the shade of the interior as if a diffusion of carbon had taken place. Reduction of the iron to the ferrous state may also contribute to this change. The black cores at this temp. are definitely replaced by persistent yellow areas and a more prolonged soaking at 750°C would not remove them. H. F. S.

An investigation of the changes taking place during the industrial firing of fire clay bricks. A. T. GREEN AND L. S. THEOBALD. *Trans. Ceram. Soc. (Eng.)*, **24**, 124-58 (1924-25).—Samples of fire bricks were withdrawn from 4 kilns at various stages during the firing and data concerning them detd. The true sp. gr. data indicate chiefly the change in the kaolinite mol. progressing from about 450° to 570°, the polymerization of the alumina mol. about 950° and some considerations respecting the vitrification range. The range of max. porosity and the other facts concerning the vitrification range are shown by the true and apparent porosity detns. The "loss on ignition" data give an indication of the commencement of the dehydration of the kaolinite and allow a time-factor during which water-vapor is being evolved from the clay subs., to be obtained. The detns. of vol. contraction substantiate the conclusions appertaining to the vitrification range, based on sp. gr. and porosity data. Visual observation of the specimens gives valuable information concerning the elimination of carbonaceous matter the appearance of "iron" specks and blotches, the color changes taking place during firing and the vitrification of the products. H. F. S.

Some fallacies to be avoided in the standardization of any method of testing the load-bearing capacities of refractories at high temperatures, and a suggested method for standardization. A. J. DALE. *Trans. Ceram. Soc. (Eng.)*, **24** [2, 3], 216-27 (1924-25).—It is suggested in this paper that methods which involve rapid application of load are unsuitable as standardized methods of testing the load-bearing capacities of refrac. mats. at high temps.; methods which require the penetration of loaded rods into the mat. are also of questionable value. Any method of testing the load-bearing capacity of fire brick mat. at high temp. is to be avoided, from the standardization viewpoint, if it involves merely one detn. of the amt. of subsidence at a fixed temp. and under a fixed load. The results from such a test will not necessarily place the mats. in order of merit from the practical load-bearing point of view. Any high temp. load-test on fire clay products which involves merely the recording of the temp. (or cone) at which collapse takes place, under a fixed load, and constant rate of rise of temp., may also yield anomalous results. H. F. S.

Dolomite as refractory material. ANON. *S. African Jour. Sci., Eng. and Mining Jour.-Press*, **120** [5], 177 (1925).—Dead burned dolomite mixed with some impurity is the best refrac. mat. available to the steel industry. Results obtained by the U. S. Bureau of Mines, Ohio State University, show that with 90% dolomite and 10% flux the best results are obtained. This compn. is found naturally in the dolomites of the Transvaal. Dolomites in this region cover an area of approx. 8500 sq. mil. These dolomites vary in compn. from 74% to 94% lime and magnesia. A dolomite contg. 10% fluxes consisting of silica, iron oxide, alumina and manganese is now used in the Transvaal iron and steel fur. For open hearth fur. the dolomite without calcination is crushed to a coarse powder and spread over the bed of the heated fur. in a bath of molten iron.

For hearths in the elec. fur. the dolomite is dead burned, ground to 4-mesh and mixed with melted tar. Dolomite in this district also has possibilities for the manuf. of paper pulp. See *Ceram. Abs.*, **8** [8], 221(1925).

H. G. F.

Magnesite mining at Red Mountain, California. GEORGE J. YOUNG. *Eng. and Mining Jour.-Press*, **120** [57], 178-80(1925).—Serpentine is the prevailing rock from which magnesite is derived by alteration, in this region. Drifts are extended into the veins or lenses along fracture zones at 3 or 4 levels. The magnesite is picked by hand, approx. 50% of the broken mat. being rejected. A bucket tram deposits the sorted magnesite at the calcining plant. Shaft and rotary calciners are used. The lump magnesite is subjected to a slow heat in the shaft of the upright fur. and to a high heat in the firing zone, the calcined mat. is removed at regular intervals. Two grades of calcined product are shipped, No. 1 white and No. 2 slightly colored. The magnesite is of high quality and suitable for plastic purposes.

H. G. F.

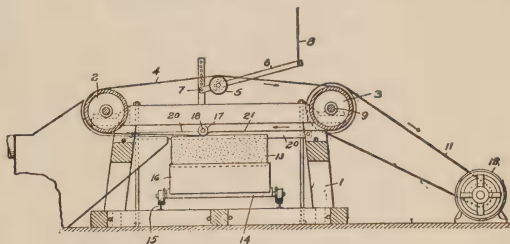
Qualities of firebrick from a metallurgical standpoint. W. GRUM-GRJIMALLO. *Feuerfest*, **1** [1, 2, 3], 19(1925); *Blast Fur. and Steel Plant*, **13** [9] (1925). Abstracted in *Ceram. Abs.*, **4** [10], 278(1925).

H. G. F.

PATENTS

Composite refractory body. JOHN WESLEY MARDEN and HENRY KNEELAND RICHARDSON. U. S. 1,554,225, Sept. 22, 1925. As an article of manuf. a composite body comprising a ceramic refrac. mat. to at least part of the surface of which a substantial layer of practically pure thorium oxide is affixed. The method of producing a composite refrac. body which comprises preparing a slip of finely divided thorium oxide, a salt adapted to function similarly to a colloid, a medium adapted to precipitate any colloid and to produce a suitable consistency for casting, subsequently applying the thus formed slip to ceramic mat. and drying.

Apparatus for dressing clay blocks. LEE SHOWERS. U. S. 1,554,925, Sept. 22, 1925. App. for dressing clay blocks comprising an abrading belt, a pulley for driving the belt, means for supporting a block with the surface to be dressed in opposition to the abrading surface of the belt, and a presser member of circular cross-section having a diameter less than one-half that of said pulley mounted for rotation back of the belt and extending transversely thereof in opposition to the block, the block and presser member being mounted for relative movement so as to permit the portion of the belt opposite the presser member to contact with the block during such relative movement.



Refractory material. G. S. FULCHER. Can. 248,315, Mar. 31, 1925. A cryst. refractory contains SiO_2 , Al_2O_3 , zirconia and alk. silicate. (C. A.)

Terra Cotta

A dollar for every terra cotta crack. ANON. *Brick and Clay Rec.*, **66** [10], 746 (1925).—A description of the many unusual features at the Advance Terra Cotta Co. plant at Chicago Heights, Ill. F. G. J.

White Wares

Can you use these ideas? ANON. *Brick and Clay Rec.*, **67** [4], 261(1925).—Many new production features described in the new sanitary pottery plant of Thomas Maddock's Sons Co., at Trenton, N. J. F. G. J.

Latest German insulator designs. ANON. *Ceram. Ind.*, 4 [6], 460(1925). (Translated from *Keram. Rund.*)—This article tells what the Germans are doing in the high tension field. F. G. J.

Seven thousand sanitary ware pieces per week. ANON. *Ceram. Ind.*, 5 [2], 137(1925).—An illustrated description of the new Maddox Sanitary Ware Pottery at Hutchinson Mills, N. J. F. G. J.

Late German electric porcelain development. L. F. THIESS. *Ceram. Ind.*, 5 [3], 219(1925).—Dimensions and prices are standardized but methods of make-up vary. F. G. J.

Templates standardize porcelain output. ANON. *Ceram. Ind.*, 5 [3], 241(1925).—An illustrated account of the Illinois Porcelain Co., at Macomb, Ill. F. G. J.

Zircon as a constituent of ceramic bodies. WALTER L. SHEARER. *The Ceramist*, 5 [6], 316-28(1925).—S. discusses the possibilities of using zircon in the making of pottery bodies resistant to sudden temperature changes. S. gives a short history of zircon, a summary of its present sources and its more important characteristics. While zircon has a large coeff. of thermal expansion it is probably free from sudden large changes of vol. such as occur with quartz. More data on the coeff. of thermal expansion of zircon should be obtained. Previous work on bodies containing zircon indicate that they have interesting possibilities. Formulas of bodies that have shown noteworthy resist. to thermal shock when fired to cone 12 are given. Their phys. properties are given. In testing a fired body, the tranverse strength of a 4" x 1" x 1" test bar, which had been heated rapidly to 950°C and quenched rapidly in a current of air from an electric fan, was taken as a measure of its power of resisting thermal shock. Experiments showed that zircon would make a desirable substitute for rather expensive calcined alumina in some bodies. Zircon imparts a high mechanical strength to a body. Formulas for high fire porcelains and porcelains for ball mill linings are given. S. advises compounding by vol. rather than weight due to the high sp. gr. of zircon. Zircon bodies can be successfully cast if the slip is properly prepared. Formulas for slips that cast well contg. 90% and 70% zircon are given. A. E. R. W.

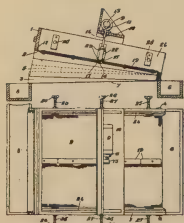
Importance of control of body mixture as a preventive of crazing. J. M. KREGER. *The Ceramist*, 6 [4], 561-4(1925).—K. describes a series of practical tests which throw some light on crazing in glazed porous bodies such as solid porcelain and terra cotta. K. concludes that under the conditions that their particular body is used, a softer and less dense body, as shown by the absorption test, is the more satisfactory. A. E. R. W.

United States Government master specifications for vitrified chinaware. Federal Specifications Board. Specification, No. 243. *The Ceramist*, 5 [6], 334-49(1925).—Specifications of chinaware and diagrams of impact testing app. A. E. R. W.

High-voltage (porcelain) insulator development. K. A. HAWLEY. *Elec. World*, 86, 360-3(1925). (C. A.)

PATENTS

Machine for sifting potters' slip and other granular or pulverulent materials. SYDNEY THOMAS HARRISON AND ARTHUR CECIL HARRISON. U. S. 1,554,821, Sept. 22, 1925. A sifting mach. of the class described, comprising a mesh, an element mounted independently of the mesh for rotation and including an eccentric, a closed casing enclosing the eccentric, ball bearings interposed between the eccentric and the casing and a rod carried by the casing and actuated by the eccentric, said rod being connected directly to the mesh to vibrate the same.



Apparatus for casting pottery ware.

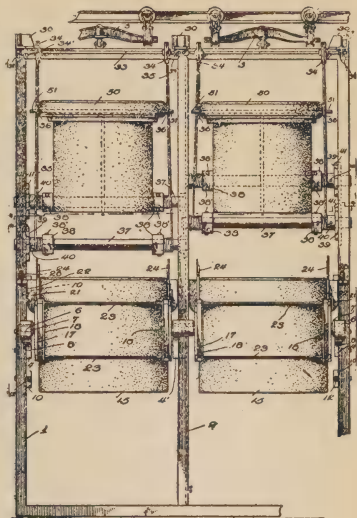
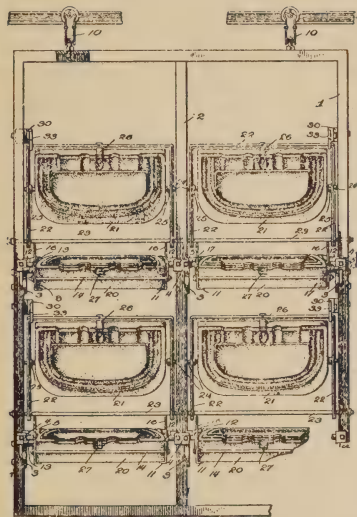
EDWARD S. LEA. U. S. 1,557,371, Oct. 13, 1925. App. for casting pottery ware from slip comprising a portable support, a mold pivoted thereon for rotary movement from charging to dumping position and a core suspended on said support above the mold and adapted to be moved into and out of coöperative engagement with the latter.

Apparatus for casting pottery ware.

EDWARD S. LEA. U. S. 1,557,372, Oct. 13, 1925. App. for casting pottery ware from slip comprising a portable support, a mold section pivoted thereon for rotary movement from charging to dumping position, a frame pivoted to said support above

the mold section and a second mold section pivoted in said frame and adapted to be swung into

and out of engagement with the first mold section by the movement of said frame.

**Equipment and Apparatus**

Are pyrometers saving money for you? They will if used and not abused. ANON. *Ceram. Ind.*, 4 [6], 444(1925).—The first of a series showing how to use the pyrometer as a cost cutting agent.

F. G. J.

Pyrometers—cost cutting agents. ANON. *Ceram. Ind.*, 5 [1], 30(1925).—A detailed description in simple terms of the mechanism of pyrometry.

F. G. J.

Optical and radiation pyrometers in ceramic plants. ANON. *Ceram. Ind.*, 5 [2], 123(1925).—Advantages and disadvantages of this type of instrument. F. G. J.

Handling raw material. ANON. *Brick and Clay Rec.*, 67 [3], 185(1925).—A few pointers on different types of equipment and hints on the proper installation of belt conveyors and bucket elevators.

F. G. J.

Fire clay ware in electric tunnel kiln. ARTURO PAOLONI. *Brick and Clay Rec.*, 67 [3], 196(1925). (Translated from *Keram. Rund.*, 2(1925).)—An account of a tunnel kiln going to 1400–1500°C with radiating rheostats of granulated artificial graphite supported by walls of silicon carbide.

F. G. J.

Would electric trucks help you? H. J. PAYNE. *Brick and Clay Rec.*, 67 [4], 256(1925).—Describes the use of elec. industrial trucks on clay plants.

F. G. J.

Saves labor of ten miners. ANON. *Brick and Clay Rec.*, 67 [5], 330(1925).—The Globe Brick Co., Kenilworth, W. Va., uses an elec. loader and 3 elec. locomotives in their clay mine.

F. G. J.

Further experience with the Dorr mill. A. S. W. ODELBURG. *Trans. Ceram. Soc. (Eng.)*, 24 [2, 3], 268–72(1924–25).—In a previous paper (*Trans.*, 22, 2(1923))

the Dorr Mill Plant as arranged at Gustavsberg was described. Since that time, the grinding has been made perfectly automatic; by opening the tap under the thickener, the finished mat. is allowed to run constantly to the flint arks. The work of the man supervising the grinding is reduced to that of an onlooker. A great advantage of this automatic regulation is that the circulation of the mat. takes place without shock or disturbance at any point or time. This is clearly shown in the thickener, where periodical cloudiness is no longer observed at the overflow. It has been proven that the Dorr mill product is of more uniform grading while that of the batch grinding gives a wider range of particles. According to experience, the Dorr product is more suitable for making good earthenware, as it is absolutely similar to the flint produced by the old pans in conjunction with "washing up." Apart from the possibilities of perfecting the process, the writer is convinced that no more scientific and easily regulated method of wet grinding minerals has yet been found, but this grinding plant is used only where a large output is required, 50 tons per week, as the work ought never to be intermittent. H. F. S.

Dielectric loss measurements on commercial insulating materials. C. DANNATT. *World Power*, 4, 141-4 (1925).—D. describes a complete testing equipment designed for lab. tests. The design, calibration and performance of an oil-immersed electrostatic wattmeter are described. (C. A.)

PATENTS

Humidity and temperature regulator.

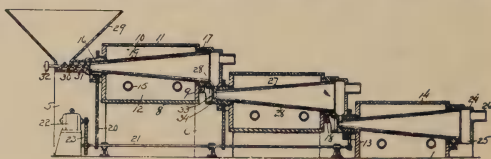
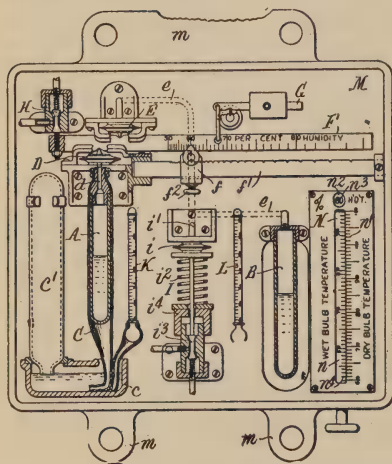
WILLIS H. CARRIER. U. S. 1,554,784, Sept. 22, 1925. In a humidity regulator, the combination with a humidity supply system and a valve operable to control the action of said system; of a rocking lever for effecting the operation of the valve, and thermoresponsive elements independently influenced by different temps., and connected to the lever at points unequally separated lengthwise of the lever from the pivotal axis of said lever, the movement of the lever being dependent upon the relation existing between said different temps., substantially as set forth.

Humidity regulator.

WILLIS H. CARRIER. U. S. 1,554,785, Sept. 22, 1925. In a humidity regulator, the combination with a valve operable to control humidity;

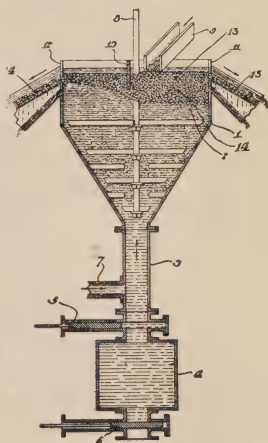
of thermoresponsive elements independently influenced by different temps., said elements being arranged and operating differentially due to changes in temp. affecting them to produce pressures acting in opposition to each other upon said valve and a motor acting on said valve supplementarily with one of said thermoresponsive elements and in opposition to the other thermoresponsive element, whereby the operation of said valve is dependent upon the relation existing between said different temps.

Rotating retort. FREDERIC S. BACON. U. S. 1,556,194, Oct. 6, 1925. A retort comprising a series of end communicating tapered tubes rotatably mounted and arranged in stepped down formation, the smaller ends of the tubes communicating with the larger ends of the tubes, the smaller ends of the tubes forming the inlet, vapor and gas conducting means for the larger end

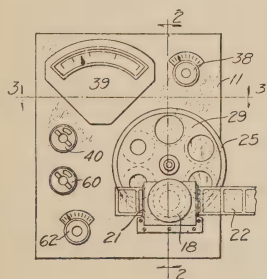


of each tube, the smaller receiving end disposed below the lower side of the larger end of the adjacent tube, there being a material collecting chamber between each tube and independently controlled heating means associated with each tube whereby gases possessing different chemical properties may be sequestered from each tube.

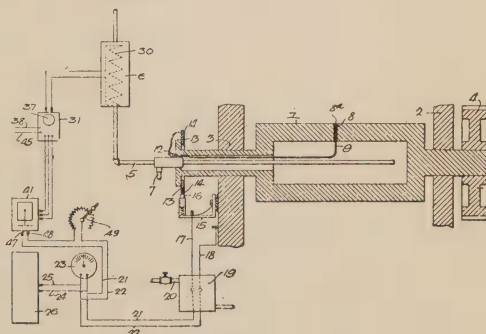
Method for separating materials. THOMAS M. CHANCE. U. S. 1,556,676, Oct. 13, 1925. A method for separating mats. of different specific gravities which consists in immersing said mats. in a maintained suspension in liquid of comminuted solid matter of greater specific gravity than said liquid and substantially insoluble therein and constituting a fluid mass having a specific gravity materially greater than that of the lightest of said materials, the quantity of said materials so immersed being sufficient to form a zone of floating materials of such thickness as to permit said floating materials to stratify in the order of their relative specific gravities; in maintaining the lower portion of said zone of floating materials as a baffle to prevent the heavier falling materials from carrying down the lightest of said materials floating at the top of said fluid mass; in causing materials of greater specific gravity than said fluid mass to sink to the lower part of said fluid mass; in removing the lighter materials floating in the upper portion of said zone of floating materials and in separately removing the materials comprising the lower parts of said zone of floating materials, whereby differential separation of the said floating materials is effected into grades of different specific gravities and in separately removing said heavier materials from the lower part of said fluid mass.



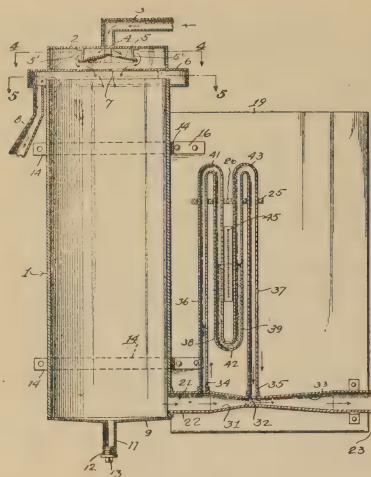
Device for measuring the opacity of translucent materials. VINCENT C. DE YBARRONDO. U. S. 1,556,766, Oct. 13, 1925. In a device for measuring the opacity of translucent substances, the combination of: a cell of changeable resistance under the influence of light rays; a luminous body; means for interposing a body of translucent substance between said cell and said luminous body; a source of electric current in circuit with said cell; an indicating instrument in said circuit; and a variable resistance shunted across said source of electric current to form a branch circuit of variable resistance for controlling the flow of electric current in the circuit of said cell.



Electric temperature control. CHARLES B. THWING. U. S. 1,557,387, Oct. 13, 1925. The combination with a roll of an element mounted adjacent to the working surface thereof and forming with said roll a thermoelectric couple, said element having different thermoelectric properties from the roll.



Viscosimeter. FRANZ P. ZIMMERLI. U. S. 1,557,517, Oct. 13, 1925. In a viscosimeter, the



combination with a container adapted to contain a substance of undetermined viscosity, an inlet pipe in the top thereof, baffle plates against which the incoming liquid is diverted as it enters the container, and an overflow outlet near the top of the container for the discharge of the excess or fluid undergoing test, of an outlet pipe narrowed at the throat extending laterally from the bottom of the container, a U-tube adjacent thereto with a measuring liquid therein, means connecting the U-tube with the outlet tube, whereby a vacuum is produced in one leg of the U-tube and a pressure in the other leg thereof, and a calibrated scale for registering the differences in the levels of the measuring fluid in the respective branches of the U-tube.

Kilns, Furnaces, Fuels and Combustion

Positive heat transfer in tunnel kiln. E. W. EKSTRAND. *Brick and Clay Rec.*, **66** [10], 753(1925).—Advocates flat arch, transverse passages in car decks and other features for uniform heat treatment. Describes kiln at Vitrefrax plant. F. G. J.

An automatic electric heater. ANON. *Fuels and Fur.*, **3** [9], 1043(1925).—An automatic elec. heater for keeping fuel oil warm near burner and at constant temp., thus aiding in atomization. R. M. K.

Well-typed burner for pulverized coal. H. W. BROOKS. *Fuels and Fur.*, **3** [9], 1047-8(1925).—The burner is described as well as a fur. in which it was used. The principle of "turbulent flow" was explained. R. M. K.

A study of kiln losses. G. A. BOLE. *Brick and Clay Rec.*, **67** [4], 264(1925).—An account of the results of the kiln investigation of the U. S. Bur. Mines. F. G. J.

The heat insulation of kilns and other high-temperature installations. A. T. GREEN. *Trans. Ceram. Soc. (Eng.)*, **24** [2, 3], 240-61(1924-25).—The selection of insulating mat. for high temp. work cannot be based on insulating efficiency alone. Before selecting such a mat. it is absolutely essential to have a complete knowledge of the circumstances of its future use, particularly regarding the face temp., to which it will be subjected. The following data will then serve well in the selection: The coefficient of thermal condy. at temp. between 300° and 800°C, or the insulating efficiency based on a test simulating indus. conditions; percentage porosity, together with some description of the nature of the pore-spaces; refractoriness, together with the temp. at which the mat. disintegrates or otherwise loses its structure; crushing strength as an indication of the mech. strength. H. F. S.

Selection of fuels and furnaces. W. TRINKS. *Fuels and Fur.*, **3** [9], 937-56, 1019-24(1925).—The subject is discussed under the following outline: 1. Introduction; 2. Sources of heat energy; 3. Utilization of heat; 4. Method of heat transfer; 5. Method of heat application; 6. Selection of fuel or heat energy to suit plant conditions; 7. Selection of type of fur. to suit plant conditions; 8. Method of handling materials. These items are compared in making any selection of fuels and furnaces. In the introduction it is stated that engineering rules and formulas, in the selection of fuels and furnaces, cannot be strictly followed when considering a given process. It

is necessary to take econ. and human factors, as well as technical factors, into account when considering such problems. That fur. and fuel should be selected which, in the heating of the material, will contribute most toward lowering the cost of a perfect finished product. Seventeen items are listed which influence the cost. Two sources of heat energy are mentioned, namely (1) heat energy derived from elec. energy and (2) heat energy derived from the combustion of fuel. Particular conditions should det. which source should be used. Recuperation, regeneration and preheating are discussed and sample calcns. are given to use to det. cost and profit of these heat recovery processes. In discussing the method of heat transfer advantages of direct fired and muffle fired furnaces and salt baths are given. Methods of suspending "stock" are given. Under fired, side fired and side fur. are described and calcns. given. If more than one fuel is available, one should study each of them in the light of plant conditions and costs. In selection of fur. to suit plant conditions, one should take every possible item of costs, layout, etc., into consideration. A questionnaire is given which shows the nature of the data that should be obtained before buying or installing a fur. The main purpose of the author is to point out some of the many variables to be taken into consideration in selecting a fur. and to urge that each case be considered in the light of the variables which have been pointed out.

R. M. K.

Automatic temperature control of fuel fired furnaces. HUNTER DICKSON. *Fuels and Fur.*, 3 [9], 1027-30(1925).—Motor operated valves are the most recent development in the automatic control of fuel. Diagrams of an automatic fuel control system together with methods of operation and charts show uniformity of regulation. Under conditions where it is possible to regulate temp. reasonably well by hand, it is possible by the use of well designed equipment to produce constant uniform heat, good furnace conditions and provide max. fuel saving.

R. M. K.

Auxiliary equipment for oil burning. KESTER MILLER. *Fuels and Fur.*, 3 [9], 1007-14(1925).—A diagram of a complete oil handling system is shown and the system described. Calculations are given for obtaining the correct pipe sizes. Many suggestions are given regarding size, shape and location of storage tanks. Several types of gages for indicating quantity of oil in storage are described.

R. M. K.

Note on powdered coal burning. ANON. *Fuels and Fur.*, 3 [9], 1018(1925).—The fur. is the most important part of any pulverized coal burning equipment. The highest thermal efficiency is effected by using low excess air, but this practice gives high fur. temp. thus causing erosion of the linings and fusion of coal ash. Suggestions are given for remedying these difficulties.

R. M. K.

Influence of pulsations on combustion. JULES DESCAMPS. *Fuels and Fur.*, 3 [9], 957-8(1925).—The author develops his discussion on the premise that correct functioning of a fur. depends upon the means employed to insure that the draft is distributed over the largest portion of the fuel surface and in the most uniform manner. In gas producer firing, "flues" or air-ducts are formed in the fuel bed and thus prevent proper surface exposure to air. The effect of these flues is partially counteracted by poking and agitation. It is recommended that combustion be stimulated by producing lateral movements of air in the coal bed thus enabling more fuel surface to be exposed to the air and aiding in counteracting the formation of vertical air-ducts. The author's pulsation method for creating transverse movements is described.

R. M. K.

Tunnel kilns for fire brick production. W. POHL. *Feuerfest.*, 1 [9], 87(1925).—An illustrated description of the tunnel kiln built by the "Keram. Ind., Bedarfs A. G.-Dresden." Over 30 now in service. Secondary air for combustion preheated to high temp. and quantity controlled irrespective of stack draft.

F. A. W.

Testing the fineness of pulverized coal. ANON. *Mech. Eng.*, 47 [10], 822(1925).—It is pointed out that the method of testing the fineness of pulverized coal by passing it

through standard 100-mesh and 200-mesh screens may be at fault in showing the actual pulverizing work done. This test should be supplemented by a microscopic examn.

C. J. H.

Combustion control by means of triangular diagrams. THÉODORE SUNNEN. *Chaleur et industrie*, 6, 266-9(1925).—Description and explanation of a graphical method for controlling combustion, more particularly of blast-furnace gases, by means of triangular coördinates (representing CO_2 , CO and O_2) having as parameter the ratio of (air actually used):(air theoretically required). When 2 of the quantities have been detd. by analysis, the other 2 can be read directly from the diagram. (C. A.)

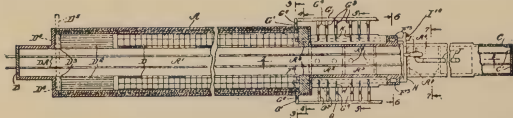
New electric furnaces for the ceramic industries. ARTURO PAOLONI. *Rev. électrochim.*, 18, 205-15(1924).—P. has designed a furnace having a "mass resistor" of graphite grains the resistance of which can be kept nearly const. by the addn. of more resistor material as it is needed. The heat generated in the "mass resistor" is transmitted to the heating chamber through a partition of crystd. SiC . By cutting channels into these partitions the temp. in the heating chamber reached 1450° . This type of furnace may have a single heating chamber and 2 "mass resistors" or 2 heating chambers and 3 "mass resistors." They have been used successfully, in sizes up to 240 kv. a., in baking ceramic products. In actual practice 40-50 kw.-hrs. were used per kg. of porcelain baked; 2500 kw.-hrs. baked 550-600 refractory bricks at 1300° .

(C. A.)

PATENTS

Furnaces for high temps. ANON. Eng. Pat. 234,877, *Colliery Guar.*, 130, 580 (1925). Two water drums connected to the steam drum by water tubes. The whole forms the shell for the actual combustion chamber; the spaces between the water-tubes are filled up by shaped brick made of refractory materials. The tubes can be subjected to the heat produced within the combustion chamber. The projections of brickwork, which protrude into the chamber, serve as heat retaining or absorbing members. By this means there is produced a channel-shaped chamber, in which the actual combustion of the injected fuel is effected. If the mixt. of fuel and air is injected from one side and ignited by means of a flame, the brick absorb a part of the heat, and a further part is transferred to the water in the boiler through the water-tubes. If, for instance, a temp. of 1700° to 1800° were produced in a combustion chamber made solely of brick, a temp. of about 1400° would result in the combustion chamber by the absorption of the radiant heat. This temp. may be raised or lowered by corresponding construction or suitable dimensions of the ht.-retaining or ht.-conducting surface. The shaped brick are not fitted in the bottom of the combustion chamber between the water pipes, as in the side walls, but in the reverse position, so that the bottom of the combustion chamber presents a substantially flat surface. O. P. R. O.

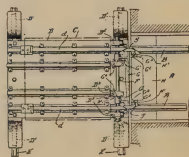
Salt glazing and kiln for same. CONRAD DRESSLER. U. S. 1,556,208, Oct. 6, 1925. The method of glazing ceramic ware which consists in moving the ware through an



maintaining a reducing atmosphere containing a vaporized glazing agent in a high temp. glazing zone portion of the chamber.

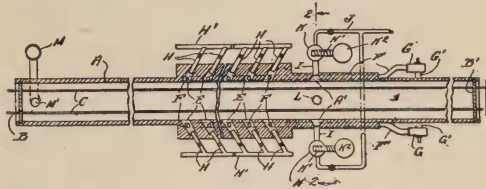
Tunnel-kiln-car construction. PAUL A. MEEHAN. U. S. 1,556,294, Oct. 6, 1925. A transfer car provided with a track over which a car can be moved onto and off the transfer car and

an elongated kiln chamber, cooling an exit end portion of the kiln chamber and heating other portions thereof as required to glaze fire and then cool the ware in its passage through the chamber,



formed in sections, one of which comprises a frame hinge connected the transfer car and track rail parts detachably connected to said frame.

Construction and operation of tunnel kilns. ROBERT W. STEERE. U. S. 1,556,260, Oct. 6, 1925. The method of firing and surface finishing ceramic ware which consists in passing the ware through an elongated kiln chamber of a continuous tunnel kiln heated to first raise the ware to a maximum temp. and then to cool the ware as the latter is moved through the kiln chamber from one end to the other, and injecting a finely divided solid material into a high temp. portion of the kiln chamber to thereby produce surface markings on the ware and restricting the dispersion longitudinally of the kiln out of said high temp. kiln portion of said solid material and the gases formed therefrom.



Geology

The Swedish feldspar industry. A. S. W. ODELBURG. *Trans. Ceram. Soc. (Eng)*, 24 [2, 3], 275-7(1924-25).—The feldspar industry is fairly widely scattered over the country, but the largest outcrops are to be found in the Baltic Archipelago in the neighborhood of Stockholm. The feldspar produced in Sweden is chiefly orthoclase. In a few of the mines albite (soda feldspar) is also found but in minor quantities. The average production per annum during the last 15 yrs. has amounted to 9500 tons. The greatest annual production shows 14,400 T. of which 8000 T. are first quality feldspar.

H. F. S.

The mining and preparation of feldspar and flint. W. M. MYERS. *The Ceramist*, 6 [2], 438-51(1925).—A report on the occurrence and methods of mining and prepn. of feldspar and flint.

A. E. R. W.

The natural history of the pegmatites. FRANK L. HESS. *Eng. and Mining J. Press*, 120 [8], 289-98(1925).—The presence of huge crystals and great masses of single minerals in pegmatites gives rise to the question as to their mode of origin and call for explanations of various phenomena. Numerous individual cases of crystals and mineral masses are discussed. The facts can best be explained by a study of the "long continued flow of soln.," theory. This allows for the possibility of the resolution either wholly or in part of previously solidified minerals, and their redeposition in other parts of a vein or dike. Numerous references are cited.

H. G. F.

Nickel ores. W. G. RUMBOLD. Imp. Inst. Res. Bur., *Monograph*(1923).—Nickel ores: their occurrence, character and uses; sources of supply; world map of nickel deposits and bibliography of lit. of nickel are discussed. Reference is made to the use of nickel oxide in the ceram. indus.

O. P. R. O.

Tungsten ores. RASTALL AND WILCOCKSON. Imp. Inst. Res. Bur., *Monograph* (1920).—Tungsten ores: their occurrence, character and uses; sources of supply and bibliography are included in this monograph. Reference is made to the use of tungsten trioxide for imparting color to glass and porcelain.

O. P. R. O.

China clay. ANON. Imp. Inst. Res. Bur., *Bull.* 22, 208(1924).—Mineral resources of Bulgaria. China-clay is found and worked at three places in northern Bulgaria.

O. P. R. O.

Bauxite—Greece. ANON. Imp. Inst. Res. Bur., *Bull.* 22, 82(1924).—M. Georgalas, Dir. Geol. Bur. of Greece, describes (in *L'Echo des Mines et de la Métallurgie*, March, p. 138 (1924)) a recent discovery of bauxite on the shores of the Bay of Aspra-Spitia, in the Gulf of Corinth. Two samples contd. 54.35 and 57.52% of alumina,

respectively, while in both cases the percentage of silica was low and the titanium dioxide was practically absent. Bauxite has been found in 5 different points over a fairly large area.

O. P. R. O.

Bauxite—India. C. S. FOX. Geol. Surv. of India, *Mem.* **49**, 1(1923).—A comprehensive acct. of the bauxite and aluminous laterite occurrences of India. Beds of rich bauxite ore have been found in several different localities.

O. P. R. O.

Fire clay. ANON. Min. and Geol. Inst. of India, *Trans.*, **20**, 181(1925).—The fire clay resources of India are believed to be practically inexhaustible. Lithomarge, kaolin, fullers' earth and bauxite are also found in India.

O. P. R. O.

Tin ores. G. M. DAVIES. Imp. Inst. Res. Bur., *Monograph*(1919).—Tin ores: their occurrence, character and uses; sources of supply and bibliography. In the ceram. industries stannic oxide is extensively used to form an opaque white in enamels, glazes and glassware. A blood-red glaze is produced by compds. of tin and chromium, while purple of Cassius is a compd. of tin and gold. Stannic sulphide is employed as a gilding mat. under the name of mosaic gold. Various pink, lilac, blue and green pigments contain tin, but they are of comparatively little importance. A mixt. of tin and lead oxides forms putty powder used in polishing glass, stone and metal. Under the name of tin ash it is used also in the pottery industry.

O. P. R. O.

Non-metallic minerals. ANON. Imp. Min. Res. Bur., *Monograph*(1925).—Aluminium (including bauxite and cryolite), barium minerals, bismuth, borates, cadmium, china clay, chrome ore and chromium, cobalt, feldspar, fluorspar, fullers' earth, magnesite. Statistics for 1920–1922.

O. P. R. O.

Chromium ore. W. G. RUMBOLD. Imp. Inst. Res. Bur., *Monograph*(1921).—Chromium ore: its occurrences, character and uses; sources of supply of ore; world map of chromite deposits and bibliography of lit. are dealt with in this monograph. Especial mention is made of the importance of chromite as a basic refrac.; and further that chromic acid, chrome yellow and chrome green are chiefly used as pigments in decorative painting and also in the ceram. indus. They form the color base of many beautiful pigments and glazes.

O. P. R. O.

Physical chemistry of igneous rock formation. J. S. FLETT. Discussion held by the Faraday Soc., Geol. Soc. and Mineral. Soc., October, 1924, 414–7.—A general review of the work in this field is given with special mention of the researches in the Geophysical Lab. at Washington.

(C. A.)

The kaolin deposit of Bettole at the foot of Monte Fenera, Val Sesia. ALLESSANDRO ROCCATI. *Rass. min. met. chim.*, **62**, 53–6(1925).—Besides the kaolin used in large quantities for refractories, another type is present which in its cryst. form resembles soap-stone. It has a waxy luster and an unctuous feeling, a hardness of 2.5, d. 2.2–2.6, n 1.53–1.54 and $m. p.$ 1750–1790°, and varies in color from green to milky white to reddish, though it approaches transparency in very thin scales. It is composed of alternate layers of amorphous and cryst. kaolin, the latter being active with polarized light. Analysis shows the kaolin, including the milky white variety, to have the compn. $H_4Al_2Si_4O_9$. At 250° for several hrs. it loses 1.40–1.70% H_2O , the remainder being liberated only at a high temp. The natural kaolin is probably an intimate mixt. of true kaolin and halloysite, the latter accounting for the amorphous component and for the loss of H_2O at a low temp.

(C. A.)

Chemistry and Physics

The heat-insulating efficiencies of some diatomaceous earth products and slag wool.

A. T. GREEN AND H. EDWARDS. *Trans. Ceram. Soc. (Eng.)*, **24**[2, 3], 228–39(1924–25).—There is a definite porosity (apparent sp. gr., consistency or packing density) for mats. of the same constitution, which gives a max. insulating efficiency. Pure diatomaceous

earth packed so as to possess an apparent sp. gr. of 0.34 has a greater insulating effect than the same mat. loosely packed (apparent sp. gr. 0.08), and the same mat. in slab form possessing an apparent sp. gr. of 0.46. The greatest insulating efficiency of slag wool is obtained with a packing of 10 lb. per cubic ft. (apparent sp. gr. 0.16) in low temp. practice.

H. F. S.

Refractory nature of common oxides. J. BRONN. *Feuerfest.*, **1** [7], 67(1925).—Curves are given plotting the m. p. of the following binary compds. variedly proportioned. Lime-alumina, lime-magnesia, magnesia-alumina, lime-iron oxide, kaolin-magnesite, kaolin-chrome.

F. A. W.

The screening problem. ANON. *Brick and Clay Rec.*, **67** [5], 338(1925).—Discussions by 4 well-known clay products manufacturers. The vibrating screen is gradually replacing the stationary type.

F. G. J.

Application of glass, enamels and glazes. I. ED. ZSCHIMMER. *Ceram. Ind.*, **4** [6], 448(1925).—How each science can learn something from the other. *Ibid.*, **II**. ED. ZSCHIMMER. *Ceram. Ind.*, **5** [1], 34(1925).—A plea that mixes be expressed on the basis of percentage compn. in all 3 industries. How you can choose a chem. formula for a glass, glaze or enamel. *Ibid.*, **III**. ED. ZSCHIMMER. *Ceram. Ind.*, **5** [2], 128(1925).—Raw mats. may be classified as (1) constant, (2) variable. For Pt. IV. See *These Abs.*, p. 333.

F. G. J.

Rare minerals of ceramics and their uses. II. A. F. GREAVES-WALKER. *Ceram. Ind.*, **5** [1], 28(1925).—This article treats of diatomaceous earth (kieselguhr) and zirconium. *Ibid.*, **III**. A. F. GREAVES-WALKER. *Ceram. Ind.*, **5** [2], 126(1925).—This article treats of mica and pyrophyllite.

F. G. J.

The relation of kaolinite to high temperatures. V. ISKYUL. *Pottery Gaz. and Glass Trade Rev.*, **50** [579], 1409(1925).—Report of a paper read at the Russian All Unions Congress of the glass and ceram. indus. He attacked with 10% caustic soda samples of kaolin fired to various temps. and generalizes on the results.

F. G. J.

Synthetic aluminum silicate. W. EITEL. *Glastechnische Ber.*, **3** [4], 122(1925).—A review of the story of mullite.

F. G. J.

Origin of clay. R. SCHWARZ AND R. WALKER. *Z. anorg. Chem.*, **145**, 304-10 (1925); *Jour. Soc. Chem. Ind.*, **44B**, 711(1925).—A new theory for the mat. formation of kaolin is based on the fact that when sols. of aluminum hydroxide and silicic acid are mixed in water in the propn. $\text{Al}_2\text{O}_3:6\text{SiO}_2$, there is pptd. a subs. $\text{Al}_2\text{O}_3, 2\text{SiO}_2, 2\text{H}_2\text{O}$ which on keeping becomes similar to kaolin. It is considered that feldspar first decomposes into KOH , $\text{Al}(\text{OH})_3$ and SiO_2 aq., and that these products reunite to form kaolin.

H. H. S.

Lower oxides of high melting point. E. FRIEDERICH AND L. SITTIG. *Z. anorg. Chem.*, **145**, 127-40(1925); *Jour. Soc. Chem. Ind.*, **44B**, 712(1925).—The following oxides were obtained by the reduction of higher oxides either by H or C: V_2O_3 m. p. 1970°; V_2O_4 m. p. 1640°, Nb_2O_3 m. p. 1780°, Ce_2O_3 m. p. 1690°, WO_2 1230-1330°; W_2O_5 , MoO_2 , Mo_2O_5 , WO_2 (blue and brown, both m. p. 2230-2330°). From TiO_2 and Ta_2O_5 no lower oxides could be obt'd., and the authors doubt whether Ta_2O_4 and Ta_2O_3 exist.

H. H. S.

The chemistry of solids. C. H. DESCH. *J. Soc. Chem. Ind.*, **44**, 907-13(1925).—The Presidential address to Section B (Chemistry) of the Brit. Assoc. Adv. Sci.

H. H. S.

Potassium from mineral silicates. J. M. DOBRESCU-CLUY. *Chem. Erde*, **2**, 83-102(1925); *Jour. Soc. Chem. Ind.*, **44B**, 643-4(1925).—The soly. in dilute HCl of the 4 minerals, biotite, phonolith, muscovite and orthoclase, is in the order named, and pot expts. on assimilation of potash by plants are in concordance with this order, the difference between biotite and orthoclase being very marked. On the other hand,

the soly. in water satd. with CO_2 did not agree with the pot expts. with regard to potash, though it did with regard to phosphoric acid. The more weathered the mineral, the more easily is the potash assimilated.

H. H. S.

Stability relations of the polymorphous system Al_2SiO_5 . F. NEUMANN. *Z. anorg. Chem.*, **145**, 193-238(1925); *Jour. Soc. Chem. Ind.*, **44B**, 711(1925).—Andalusite, disthene, sillimanite and mullite (62.89% Al_2O_3 , 37.11% SiO_2) were investigated by spec. ht. detns. and the application of Nernst's heat theorem. From abs. zero to 1487° sillimanite is the stable modification, while at higher temps. andalusite is stable. Disthene is totally unstable up to 1300° in the disthene-sillimanite system. Andalusite at 1200° is converted into mullite and amorphous silica. Disthene is similarly changed to 1400° but sillimanite appears to undergo no change on heating.

H. H. S.

Inexpensive method for determining lead. W. W. SCOTT. *Ind. Eng. Chem.*, **17**, 678(1925).—Dissolve the PbCrO_4 ppt., produced in the usual way, in HCl and NaCl mixt. and titrate the chromic acid with FeSO_4 , using diphenylamine as indicator. Not more than 10 cc. of 12 N HCl should be present in 150 cc. of soln. or the addn. of acetate is necessary to reduce the acidity.

(C. A.)

Electrical conductivity and coagulating power of acids and of bases. G. ROSSI AND M. ANDREANELLI. *Gazz. chim. ital.*, **55**, 99-103(1925).—Experience has shown that solns. of acids and bases having the same elec. condy. do not have the same coagulating power toward negative and positive colloids, resp. This property depends on many factors and cannot be expressed by so simple a law as that of Hardy. Perrin (*J. chim. phys.* **3**, 50(1905)) modified this law thus: The coagulation of a negative hydrosol by means of various acids is brought about by means of solns. contg. the same no. of H ions and also, basic solns. that have the same coagulating power for a positive hydrosol contain the same no. of OH ions. These statements consider the phenomenon as purely elec. but if the phenomena of positive and negative adsorption described by R. that lead to neutralization of the particle and to coagulation (*C. A.*, **18**, 3510) are taken into account, P.'s statements are not adequate. Moreover the coagulating power of the same solns. of acids may become inverted in 2 different negative colloids. In fact a given soln. of HCl coagulates a soln. of As_2S_3 more effectively than a soln. of H_2SO_4 having the same sp. elec. condy. as that of the HCl , but the same H_2SO_4 soln. has a greater coagulating power than the HCl soln. toward a colloidal soln. of Congo red. The latter observations are just the reverse of what is to be expected in terms of P.'s generalizations.

(C. A.)

Properties and origin of zeolites. O. WEIGEL. *Sitzungsber. Ges. Beförderung. Naturwiss. Marburg*, **1924**, 73-101; *Chem. Zentr.*, **1924**, II, 2239.—In the formation of zeolites, where the silicate atoms have assumed a comparatively rigid lattice orientation, the solvent in which the crystals form remains within the lattice meshes, without however, contributing to the lattice structure. Energy is lost through overcoming the internal pressure of the solvent and this energy aids in the erection of the lattice. The latter retains its rigidity under various conditions and the energy of the internal pressure is free and serves to bind foreign substances. The ready exchange of bases is explained by weakened bonds in the silicate lattice. The relation between temp., the vapor pressure of the surroundings and the amt. of adsorbed foreign mols. can be expressed by a modified van der Waals' equation: $n = n/b - [R(T-T_s)v^2]/[(v-nb)(\sqrt{-aa'})]$, the derivation of which is given in the original, n being the no. of adsorbed mols. on a silicate mol., R the gas const., T the abs. temp., T_s the temp. of the satn. pressure of the liquid phase of the foreign substance which itself is a temp. T in the medium surrounding the crystal, a the van der Waals' const. of the medium in which the zeolite forms at the temp. and pressure involved and b a const. The equation has within certain limits given results conforming well to the exptl. material available.

(C. A.)

The direct determination of tervalent iron in acid-insoluble silicates. The accuracy of the method for determining the valency of iron by attacking the silicate with hydrofluoric and sulphuric acids. O. HACKL. *Z. anal. Chem.*, **66**, 401-30(1925).—The common practice in the analysis of silicates is to det. the total Fe in one sample and in another sample the ferrous Fe after attack by HF and H₂SO₄. In many cases, it is better to det. the ferric Fe directly, rather than by difference, making use of the reaction with TiCl₃ and thiocyanate as indicator. In this paper the results of an exhaustive study of all the factors influencing the accuracy of such a method are described in detail. In the first expts. a 0.025 N TiCl₃ soln. was used and was prone to oxidation but with 0.1 N TiCl₃ in dil. HCl, the soln. was stable without changing its titer in 2 months, under an atm. of CO₂. During the treatment of material with HF and H₂SO₄ under CO₂, there is always danger of oxidizing a little Fe but if care is taken this error should not correspond to more than about 2 mg. Fe₂O₃. Strong diln. should be avoided. The presence of HF interferes but the error is overcome to a large degree by adding a large excess of H₃BO₃. For 1 g. of rock powder, a little water, 7 cc. of HF and 10 cc. of 18 N H₂SO₄ are recommended. After heating 7 min. in CO₂ transfer the crucible with cover and all to a mixt. of 100 cc. 4% H₃BO₃ soln., 50 cc. of water and 5 cc. of 3.3% KCNS soln. Titrate with acid TiCl₃ and at the end-point make sure that a drop of ferric soln. causes a permanent coloration with KCNS. (C. A.)

Manufacture of boric acid in Tuscany. P. G. CONTI. *J. Soc. Chem. Ind.*, **44**, 343-5T(1925).—A description of present methods and of their historical development. (C. A.)

Mechanism of the production of Solvay soda. I. CIOCHINĂ. *Bul. soc. chim. România*, **7**, 24-6(1925).—C. considers that the following are the reactions involved: $\text{CO}_2 + \text{NH}_3 = \text{NH}_2\text{COOH}$; $\text{NH}_2\text{COOH} + \text{NaCl} = \text{NH}_2\text{COONa} + \text{HCl}$; $\text{NH}_2\text{COONa} + \text{HCl} + \text{H}_2\text{O} = \text{NaHCO}_3 + \text{NH}_4\text{Cl}$. (C. A.)

The determination of the electrical penetrability of glasses and ceramic materials. M. PIRANI AND H. SCHÖNBORN. *Z. tech. Physik*, **6**, 351-4(1925).—A method is described for the detn. of the temp. of elec. penetrability; a linear relationship exists between this temp. and the elec. condy. (C. A.)

Methods of investigation of the ceramic value of feldspars and pegmatites. H. KOHL. *Sprechsaal*, **57**, 361-4, 374-5; *Chem. Zentr.*, **1924**, II, 1974.—Ordinary analysis involving decompn. with concd. H₂SO₄ is unsatisfactory. The method of Kallauner-Matejka (no reference) is superior. The sample is ignited at 750° and is then decompd. by dil. HCl. The feldspar content can be detd. only by chem. analysis and free SiO₂ in an approx. way by the cone m. p. method. More accurate results are possible by optical methods. (C. A.)

The mineralogical phase rule. N. L. BOWEN. *J. Wash. Acad. Sci.*, **15**, 280-4 (1925).—A discussion of the mineralogical phase rule (cf. Goldschmidt, *C. A.*, **5**, 3750, 3785) led to the summary "that in all attempts to decide, on the basis of the no. of phases, whether equil. has been attained in a metamorphic rock it is essential to bear in mind the fundamental assumptions as to the no. of components." (C. A.)

Silicates. W. ERREL. *Z. Elektrochem.*, **30**, 364-70(1924).—A review of the work of other investigators on the systems SiO₂-Al₂O₃, MgO-SiO₂, CaO-SiO₂, CaO-Al₂O₃-SiO₂, diopside-anorthite-albite, anorthite-forsterite-quartz, SiO₂-K₂SiO₃-H₂O, CaCO₃-nepheline. A bomb furnace for the examn. of the equil. between carbonates and silicates under pressure is described and illustrated. (C. A.)

Electric charge of clay colloids. D. R. HOAGLAND AND W. C. DAYHUFF. *Calif. Sta. Rept.*, **1923**, 171.—A highly colloidal clay taken from the recently dried bed of Lake Rosamund yielded colloid which was charged negatively by an elec. current at all H-ion concns. between p_H 2 and 12. The presence of cations decreased the intensity of

the charge. No evidence of an isoelec. point was obtained. See *Ceram. Abs.*, **8** [7], 204(1925). (C. A.)

The sedimentation of clay and other suspensions. R. E. LIESEGANG. *Sprechsaal*, **56**, 513-4(1923); *Chem. Zentr.*, **1924**, II, 597; cf. *C. A.*, **18**, 2256.—A description of certain phenomena connected with the sedimentation of finely divided BaSO_4 (blanc fixe). The latter usually settles and leaves a sharp boundary, *i. e.*, does not leave a supernatant turbidity. But if the BaSO_4 is formed, not with a slight excess of sulphate, but with an excess of BaCl_2 or with the addn. of glycerol or of gelatin, then a turbidity remains for a long time over the ppt. Moreover the height of the line of demarcation of the ppt. is altered by these added substances. (C. A.)

An upper limit for the thickness of the adsorption layer on silica. D. C. JONES. *J. Phys. Chem.*, **29**, 369-75(1925).—Although nitrobenzene is strongly adsorbed from kerosene soln. by SiO_2 , no change in concn. was observed on adding 4.65 g. of 120-mesh SiO_2 glass to 3.376 g. of 3.45% soln. A Hilger interferometer capable of detecting a change in concn. of 0.00429 g. nitrobenzene in 100 g. soln. was employed. The upper limit for the thickness of the adsorbed layer of nitrobenzene, on the assumption that the d. is the same as that of the pure liquid in bulk and the mols. are cubical, is about 5 mols. (C. A.)

Haveg, a construction material for chemical apparatus. J. K. WIRTH. *Chem.-Ztg.*, **49**, 653-4(1925).—Haveg is composed of bakelite and fibrous asbestos very high in SiO_2 . Its sp. gr. is 2.0; its resistance to compression is 800 kg. per sq. cm.; its resistance to bending is 440 kg. per sq. cm.; it is highly resistant to sudden shock; round and sq. tanks up to 6 cu. m. capacity, filter-presses, etc., have been constructed, with Fe reinforcing when necessary; it resists sudden heating and cooling up to 130° (a special quality up to 200°); the heat condy. of ordinary Haveg is not high, but a special compn. serves well for evapg. vessels. It is practically unaffected by 25% HCl , hot or cold, and resists the following reagents unusually well: strong and hot solns. of metallic salts, H_2S , bleach solns., $\text{Cl-H}_2\text{O}$, S up to 130° , oxalic, lactic and citric acids and HCOOH up to 40% and H_2SO_4 up to 50%, alc., petroleum, CCl_4 and *aniline salts solns.* (but no aniline). It is attacked by concd. HCOOH , HNO_3 , CrO_3 , HF , the strong inorg. alkalis, pyridine and aniline (not its salts). (C. A.)

The importance of colloid chemistry in mineralogy and geology. C. DOELTER. *Kolloid-Z.*, Spec. No., Apr. 1, 1925, 95-103.—A review which includes a discussion of: (1) transformation of colloid ppts. into cryst.; (2) distinction between colloid and cryst. minerals; (3) formation of colloid minerals in nature; (4) occurrence of colloidal minerals in sediments and (5) the color of colloidal minerals. (C. A.)

Rate of decomposition of solid substances. I. Rate of dissociation of magnesium carbonates. M. TZENTNERSHVER AND B. BRUŽS. *Z. physik. Chem.*, **115**, 365-76 (1925); cf. *C. A.*, **19**, 2159.—By measuring the CO_2 evolved, T. and B. measure the rate of decompn. of Mg. carbonates: MgCO_3 at 395° ; MgO.MgCO_3 at 452, 460, 462° ; 3MgO.MgCO_3 at 487° . The reaction is always of the first order and the total process can be resolved in a series of consecutive steps. The reaction const. is an exponential function of the temp. (C. A.)

General principles of ion effects on colloids. LEONAR MICHAELIS. *2nd Colloid Symposium Monograph* (Northwestern Univ.), **1924**, 15 pp.(publ. 1925).—The addn. of ions to a sol may produce two effects: (I) *direct* or *electrostatic*, due to its fixation (which may be adsorption or chem. combination); (II) *indirect*, *hydrophylic* or *lyotropic* effect due to competition between micelles and dissolved ions for water. Under I three possibilities may lead to formation of an elec. double layer: (a) *appositional adsorption*, the ion most highly adsorbed detg. particle charge; (b) dissociation tendency in colloidal particles; (c) orientation of polar water mols. at indifferent surfaces. Silicic acid,

nucleic acids, resin acids (*e. g.*, mastic), etc., are *acidoids*. They are insol., but *tend* to go into soln. and in absence of easily adsorbable ions (Ca, Al) form a layer of H ions which, after Gouy, need not be monomolecular, but may have *diffusivity*. M.'s early view that the surface potential in such cases is due to C_H^+ in the soln. was not experimentally confirmed. "Evidently the potential asymptotically approaches zero with increasing H-ion concn. This fact is strictly contrary to Nernst's logarithmic law in metallic electrodes." The charge of a metallic H electrode results from the balance between 2 tendencies: the H tends to send H ions into the soln., the electrode remaining negatively charged, while H ions from the soln. tend to settle on the metal and charge it positively. "The abs. zero of charge is given approx. in a p_H equal to 4.5, calcg. from the abs. value of the calomel electrode." Colloidal acidoids also tend to emit H ions and become $-$, but H ions of the soln. do not tend to settle on the solid particle and charge it $+$. Colloids like gelatin, casein, etc., may be charged $+$ or $-$, and have isoelec. points at definite characteristic p_H , depending on the balance between the tendencies: $R.NH_2 + H^+ = RNH_3^+$, and $R.COOH = R.COO^- + H^+$. They act like amphoteric electrolytes, and may be called *ampholytoids*. A third group of colloids form double layers without active participation of the colloidal phase, *e. g.*, cellulose, paper, collodion, agar, parchment paper, gas bubbles, in aq. and sometimes even in non-aq. solns. Though generally negatively charged in water, Coehn's law does not hold. While Al salts easily give a $+$ charge to glass, kaolin, mastic, etc., they at most reduce the charge of the third group to zero. As J. Loeb showed, it took quadrivalent Th to make collodion positive. A purely formal explanation of the ionic double layer is that indifferent substances adsorb $-$ ions better than $+$ ions; this "does not involve the supposition that the adsorbent actively participates in adsorption; the real cause of this phenomenon is somewhat problematic." As a working hypothesis M. supposes that OH ions have a greater capillary activity than H ions, so that any aq. interface will be charged $-$ against the mass of water, unless the body touched has forces which disturb the distribution spontaneously aimed at. Orientation of H_2O mols. at the interface might account for the charge, Loeb having found a negative potential of about 7 millivolts with indifferent substances like collodion, graphite and Au. *Flocculation* by electrolytes usually involves adsorption, but this is not so for acids. Thus HCl in great diln. coagulates mastic sol by suppressing the tendency of the mastic to emit H ions, thus destroying the double layer, without being adsorbed. In most other cases *exchange adsorption* occurs, the "original ions" being replaced by other, as per the laws of Hardy and of Schultze. The *Donnan equil.* formulas "may be applied for a limited case of dissociation tendency, namely, for colloidal micellae rich in water." Agar, which is always electronegative and shows no isoelec. point, swells most in pure water. All electrolytes up to about 0.01–0.1 *N* concn. reduce swelling, only the valence number of the cation being in evidence. The H-ion is exceptional, its effect exceeding that of tervalent ions. In higher concns. the *lyotropic* or *Hofmeister series* becomes more and more manifest. A colloidal jelly *Konyaku* (obtained from *Amorphophallus Konyaku*) is entirely without elec. charge, except in presence of many OH ions; and though no ions show any electrostatic effect, in higher concns. (about *N*), "the effect of different electrolytes on the swelling is quite enormous, and does not depend on the valence no. or sign of the charge, but follows the Hofmeister series." Li causes enormous shrinking, while Na and K have a very small effect. (C. A.)

PATENTS

Manufacturing red lead. HENRY HOCKING. U. S. 1,556,820, Oct. 13, 1925. The process of making red lead which comprises enclosing lead containing mat. in a pressure tight vessel, simultaneously enclosing in the said vessel rolling bodies made of mat. the melting point of which is considerably higher than that of lead, maintaining within the said vessel a raised pressure by means of an oxidizing gas under pressure and

rotating the said vessel while the charge therein is being heated to a temp. above the melting point of lead.

Production of alkali-silicate solution. LAURENCE WILLIAM CODD. U. S. 1,557,491, Oct. 13, 1925. The process of making alkali silicates of high ratio of silica to soda solutions which comprises subjecting an alkali silicate solution to limited electrolysis without substantial separation of silica until a solution is obtained in which the ratio of silica to soda is less than fifteen to one.

Preparation of chemically pure salts of alumina. ANON. Fr. Pat. 574,983, *Oil and Color Trades Jour.*, 68, 912 (1925). Bauxite, clay, or similar mineral subs. are dissociated with sulphuric acid, then dissolved in water and the soln. satd. with hydrogen chloride. This ppts. aluminium chloride, which is practically free from iron and is afterwards purified. O. P. R. O.

General

Bureau of Standards investigations of pottery, heavy clay products, glass and enamels. ANON. *The Ceramist*, 6 [5], 621-61(1925).—A digest of the work of the B. of S. in the ceram. indus. during the past year. The following investigations are discussed and the information so far obtained from them given in compact form. **I. Pottery and fine ceram.** (1) Study of commercial feldspars of the whiteware indus. (2) The principles of controlling clay suspensions. (3) Increasing the resist. of glaze on semi-vitreous ware to crazing. (4) The correlation of lab. tests of vitreous tableware with life in actual service. **II. Glass and enamels.** (1) A study of the factors affecting the detn. of viscosity of commercial glasses at working temps. (2) The reln. of the compn. of glass and its phys. properties. (3) The reln. of the compn. and method of manuf. of cast iron to its enameling properties. (4) Vitreous enamels for sheet iron and steel. (5) Principles underlying the properties of enamel suspensions. **IV. Refractories.** (1) The properties of commercial refrac. of the plastic clay type. (2) The properties of fire clay when used as a mortar. (3) Factors controlling the life of tank block in service. **V. Heavy clay products.** (1) Sagger clays, their chem. and phys. properties. (2) The strength of hollow bldg. tile and its possibilities in floor and wall construction. (3) Factors controlling the drying of clays. (4) The mechanics involved in the efficiency of extrusion machines. **VI. Laboratory methods and plant machinery.** (1) Glaze compn. and its effect on resistance to cutlery marking. (2) Novel app. for testing transverse strength of clay lab. specimens. (3) An elec. fur. especially adapted to the detn. of softening points. **VII. Specifications.** (1) Master specif. for vitreous chinaware. (2) Proposed master specif. for fire clay. (3) Proposed master specif. for fire clay brick. (4) Proposed master specif. for plastic fire clay refrac. (5) Work of the standards committee of the AMERICAN CERAMIC SOCIETY. **VIII. Fellowships.** Investigations of pyrometric cones. A. E. R. W.

The clay, clay products and kindred mineral industry of New Jersey. M. W. TWICHELL. *The Ceramist*, 6 [3], 505-11(1925).—Excerpts of interest to ceramists from a pamphlet "The Mineral Industry of New Jersey for 1923" issued by the State Dept. of Conservation and Development. A. E. R. W.

The extent of the ceramic industry. CHARLES F. BINNS. *The Ceramist*, 6 [3], 525-34(1925).—A historical discussion of the origin and development of pottery industries. A. E. R. W.

Ohio manufacturers boost ceramic education. ANON. *Ceram. Ind.*, 4 [6], 445 (1925).—An account of addresses delivered at the joint meeting of the Trades, Technique, and Management Forum of the U. S. Potters' Association and the Ohio Ceramic Industries Association, May 22, 1925. F. G. J.

Spend \$1725 and save \$8000. ANON. *Ceram. Ind.*, 4 [6], 446(1925).—A comparison of costs of tractors against wheelbarrows. F. G. J.

Raw mats.—their properties and uses. A. F. GREAVES-WALKER. *Ceram. Ind.*, 4 [6], 447(1925).—This article treats of bentonite and andalusite. F. G. J.

Ten thousand tons of china clay by osmosis. ANON. *Ceram. Ind.*, 4 [6], 464 (1925).—An account of clay washing plant. No details of the osmosis machines are given. F. G. J.

What kind of clay drill shall I use? ANON. *Brick and Clay Rec.*, 66 [12], 911 (1925).—Describes the important points of the different types of drills. F. G. J.

Study of clay drying. ANON. *Bur. Standards, Tech. News Bull.*, 101, Sept. (1925).—Tests were made with differential thermocouples at differential dry and plastic depths in dry and plastic cubes of clay while subjecting to drying conditions. The plastic cubes cracked badly. Max. temp. differences 8°C and 2°C in different tests. F. G. J.

The clay industry of California. ROBERT LINTON. *Brick and Clay Rec.*, 67 [3], 193(1925). F. G. J.

The weathering of clays. W. J. REES. *Pottery Gaz. and Glass Trade Rev.*, 50 [579], 1395(1925).—An address at the Clay Convention. Weathering classed as phys., chem. and organic. F. G. J.

Glues and cements for pottery, glass, etc. ANON. *Pottery Gaz. and Glass Trades Rev.*, 50 [579], 1422(1925).—Recipes. F. G. J.

Ceramic school. E. L. CHICANOT. *Indus. Canada*, 26, 52(1925).—First ceramic school in Empire. The clay resources of Canada justified to Saskatchewan the establishment of a training school for men to develop the clay products industry of the Province. This school, under direction of W. G. Worcester, was established nearly four years ago; broadly it follows the lines of the ceramic courses at the universities of Ohio and Illinois. The school is well equipped; and further, great hopes are entertained from the use of a new design of kiln to utilize the Sask. lignite coals, the only domestic fuel in the province. O. P. R. O.

Rapid production of vitrified clay ware by combined effect of heat and pressure. A. J. DALE. *Jour. Soc. Chem. Ind.*, 44B, 717(1925).—Abstracted in *Ceram. Abs.*, 4 [11], 308(1925). H. H. S.

A visit to the osmosis plant at Carlsbad. S. R. HIND. *Trans. Ceram. Soc. (Eng.)*, 24, 73-85(1924-25).—Abstracted, *Ceram. Abs.*, 4 [6], 177(1925). H. F. S.

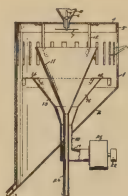
High tribute to Charles Fergus Binns. ANON. *The Clay Worker*, 83 [7], 617 (1925).—At the commencement exercises at Alfred Univ., Professor Binns was invested with the Hood of Honor, made a Doctor of Science, and presented with a Testimonial of Appreciation by the AMERICAN CERAMIC SOCIETY. F. G. J.

Extent of the ceramic field. C. F. BINNS. *The Clay Worker*, 83 [7], 617(1925).—Doctor's oration, covering the history of pottery. F. G. J.

PATENTS

Filtering material and process of preparing the same. DAVID T. DAY. U. S. 1,555,639, Sept. 29, 1925. The process of preparing a filtering compd. from a porous spent shale of a siliceous nature, heating the shale with a strong caustic soda solution whereby the caustic soda enters the pores of the shale and forms sodium silicate with the silica in the pores, adding sulphuric acid to set free silicic acid in the pores, washing the shale with water until free from sodium sulphate, and heating the washed shale to a low red heat until dry.

Process for preparing a filtering material. DAVID T. DAY. U. S. 1,555,640, Sept. 29, 1925. A process for preparing a filtering mat. comprising heating a mixture of shale and alkali and grinding the resulting product.



Process for separating calcined colemanite from clay and other impurities. HENRY D. HELLMERS. U. S. 1,556,110, Oct. 6, 1925. The process for separating calcined colemanite from clay and other impurities which consists in discharging the material to be treated peripherally by centrifugal force in baffling the lighter particles dropping naturally within a limited central area and collecting the particles in a receiving vessel and in drawing certain of the heavier particles dropping outside of the receiving vessel into a second vessel by suction.

Material for resisting oxidation at high temperatures. RUDOLPH F. FLINTERMANN. U. S. 1,556,776, Oct. 13, 1925. An alloy for resisting oxidation at high temperatures containing nickel or cobalt in an amount greater than 20% and less than 60%, silicon in an amount greater than 3% and less than 9% and the balance principally of iron.

AUTHOR INDEX TO ABSTRACTS

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